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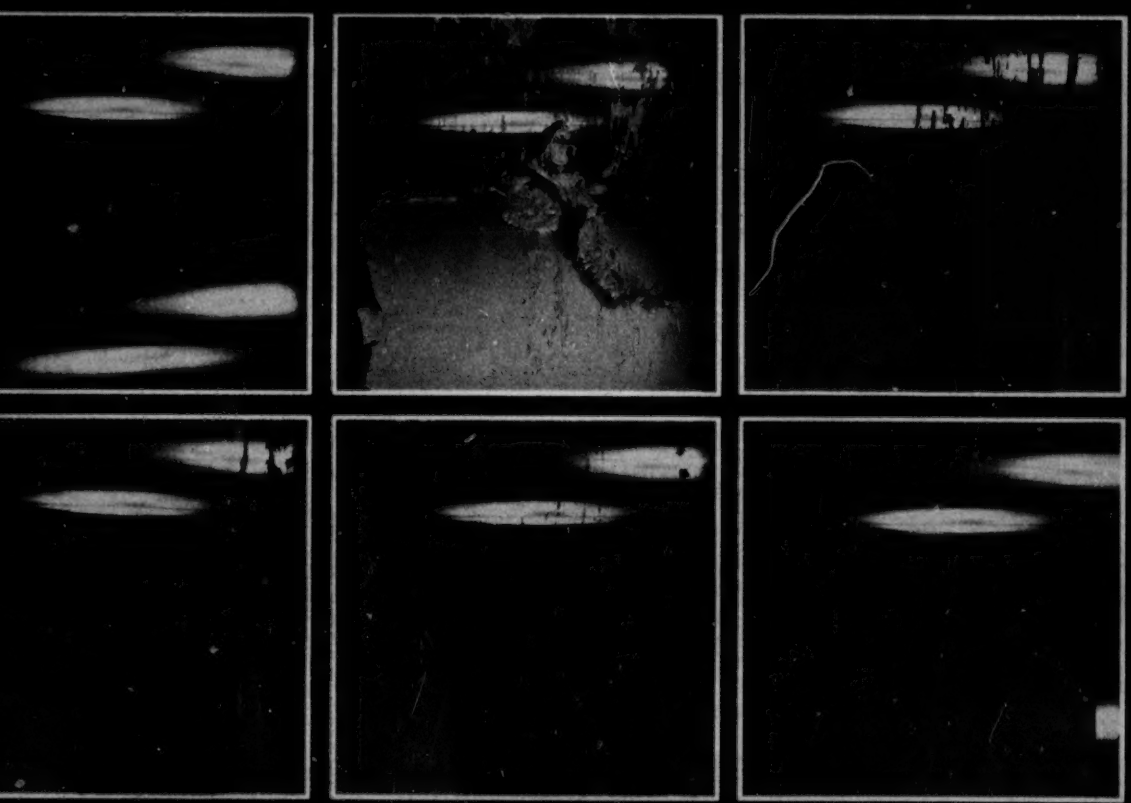
Dispersions: a new name, a new game



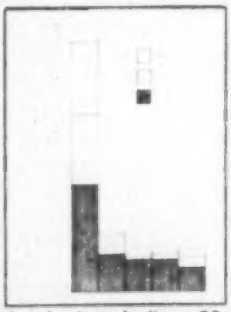
Secondary accelerator effect on aging

Instrumental troubleshooting techniques

Automated batch-to-batch consistency

Rubber World

VOLUME 187/NUMBER 3/DECEMBER 1982



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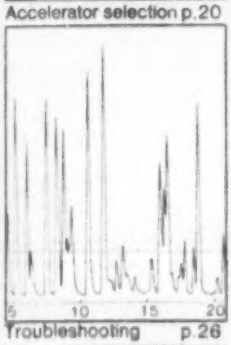

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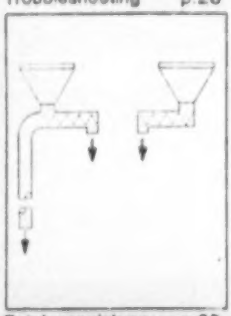

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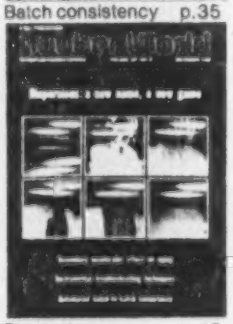

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Cover

Cover photos courtesy of Polychem Dispersions, Middlefield, OH.

ABP

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tributor for **TBMA Components BV**, Holland, line material and process handling products.

Montefluos (Montedison Group) will assume overall responsibility in the field of PTFE resins, manufactured by **PCUK**, including handling research/application/production and marketing.

Markets

The Association of Natural Rubber Producing Countries reduced the amount of natural rubber it was withholding from the market by 100,000 tons. ANRPC will withhold 250,000 tons of natural rubber in hopes of checking falling prices for the commodity. They had planned to withhold 350,000 tons but an additional purchase made by the INRO buffer stock manager led to the decrease.

RMA industry rubber report through August 1982
(figures are expressed in metric tons)

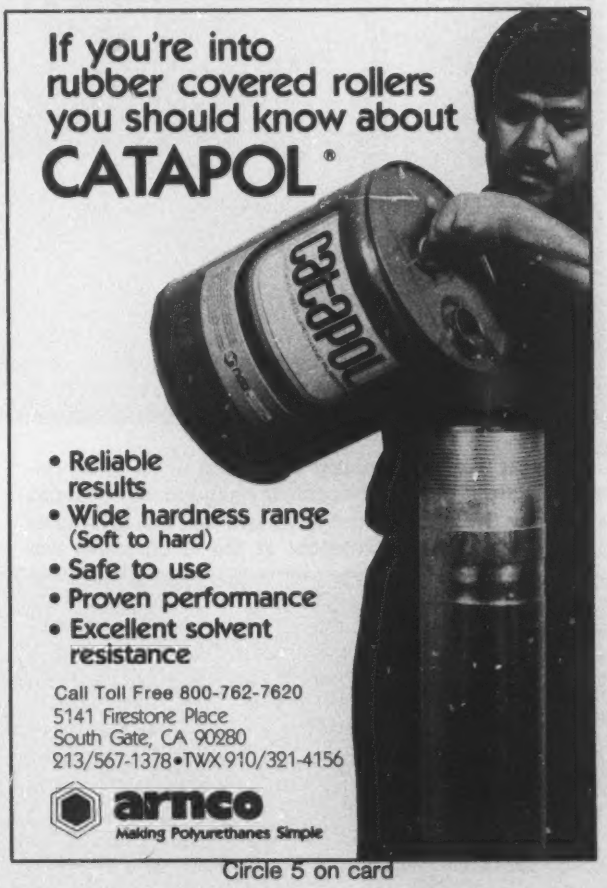
	Cumulative 1982	Cumulative 1981	% Change 82 vs 81
Total New Rubber			
New rubber available	1,670,707	1,921,256	–13.04
Exports	217,412	265,682	–18.17
Consumption	1,489,724	1,722,364	–13.51
Total Natural Rubber			
Imports	430,368	430,605	–.06
Consumption	411,669	432,944	–4.91
Total Synthetic Rubber			
Production	1,154,550	1,399,839	–17.52
Imports	85,757	90,303	–5.03
Exports	207,340	254,122	–18.41
Consumption	1,078,055	1,289,420	–16.39
% Total New Rubber	72.37	74.86	
Total SBR			
Production	598,622	721,508	–17.03
Imports	34,989	33,453	4.59
Exports	60,291	78,205	–22.91
Consumption	601,298	701,400	–14.27
Total Nitrile			
Production	32,969	44,555	–26.00
Imports	5,243	7,312	–28.30
Exports	4,293	4,648	–7.64
Consumption	33,644	46,207	–27.19
Polybutadiene			
Production	197,607	230,005	–14.09
Imports	19,979	19,459	2.67
Exports	9,387	23,112	–59.38
Consumption	200,495	225,226	–10.98
Ethylene-Propylene			
Production	89,379	122,047	–26.77
Imports	177	126	40.48
Exports	19,936	23,250	–14.25
Consumption	78,087	91,931	–15.06
Butyl, Polyisoprene, Silicone and other Synthetic Elastomers			
Production	153,605	185,011	–16.98
Imports	24,431	28,697	–14.87
Exports	79,398	90,080	–11.86
Consumption	111,334	159,413	–30.16
Butyl			
Imports	18,431	16,236	13.52
Exports	42,603	46,989	–9.33
Polyisoprene			
Imports	3,607	8,486	–57.49
Exports	3,466	5,876	–41.01
Polychloroprene			
Production	82,368	96,713	–14.83
Imports	938	1,256	–25.32
Exports	34,034	34,827	–2.28
Consumption	53,197	65,243	–18.46

RMA monthly tire shipments & production report
August 1982
(Figures in Thousands of Units)

Passenger Tires	YTD 1982	YTD 1981*	% Change
Shipments			
Original Equipment	23,217	25,693	–9.64
Radial	19,436	21,367	–9.04
Replacement	87,226	84,594	+3.11
Radial	56,225	50,195	+12.01
Export	1,883	2,813	–33.06
Radial	1,015	1,714	–40.78
Total	112,326	113,100	–0.68
Radial	76,676	73,276	+4.64
Production	100,608	101,918	–1.29
Radial	68,229	65,058	+4.87
Truck & Bus Tires			
Shipments			
Original Equipment	3,305	4,161	–20.57
Radial	1,273	1,036	+22.88
Replacement	18,331	18,810	–2.55
Radial	5,295	4,792	+10.50
Export	639	1,263	–49.41
Radial	173	160	+8.13
Total	22,275	24,234	–8.08
Radial	6,741	5,988	+12.58
Production	19,426	21,741	–10.65
Radial	4,931	3,979	+23.93

News

Firestone will discontinue manufacturing emulsion SBR synthetic rubber at its Lake Charles, LA, plant in 1983. The plant will continue to manufacture solution SBR rubber. An overcapacity in the industry was cited for the action. Firestone says it has adequate inventories of emulsion SBR to satisfy customers through 1983. The move will idle 165 employees.



Circle 5 on card

Rubber World Stock

Name	Symbol	PRICE High	Low	Close	Change Amt	Change Pct	52 Week High	52 Week Low	TREND TO MARKET Price Trend (% per day) Last 30 Days	Price Trend (% per day) Last 5 Days	Volume Trend (% per day) Last 30 Days	Volume Trend (% per day) Last 5 Days	Last Fiscal Year	EARNINGS/SHARE Latest 12 Months vs Preceding 12 Months Change Amt	Change Pct	5 Year Annual Growth Rate	Profit Margin
		$	$	$	$	%	$	$	%	%	%	%	$	$	%	%	%
Tires and Inner Tubes																	
Aegis Corp	AO	2.75	2.00	2.50	-.13	-4.76	3.00	2.00	-.36	-.65	3.59	-32.39	.42	.07 N	21.2	5.0	2.7
Alliance Tire	ATRA	7.25	6.00	6.50	-.25	-3.70	13.13	6.00	-.43	-2.08	7.23	-11.98	.02	-1.53 S	-137.8	-15.0	.7
Armstrong Rub	ARM	25.75	21.50	25.50	2.25	9.68	25.75	14.00	.27	1.88	2.64	23.86	3.99	6.18 N	NE	-5.0	3.0
Bandag Inc	BDG	37.13	33.50	36.50	1.75	5.04	37.13	20.75	.11	.28	-5.28	-36.21	2.76	.09 N	3.2	16.0	10.7
Cooper Tire	CTB	33.75	27.38	33.50	5.75	20.72	33.75	13.88	.97	1.13	.51	10.87	4.05	-.20 N	-4.4	29.0	4.4
Dunlop Holding	DLP	1.00	.88	.88	-.13	-12.50	1.50	.81	-.12	-1.07	2.42	20.00	-.04	.00 F	NE	-24.0	-.3
Firestone Tire	FIR	16.00	13.00	15.88	2.25	16.51	16.00	9.75	.61	.58	.62	-2.80	1.36	-.22 N	-21.7	-25.0	1.8
Gen Tire	GY	29.00	26.25	27.25	-.38	-1.36	29.00	17.88	-.10	-.87	-1.85	13.02	2.63	-.33 N	-10.9	-16.0	3.0
Goodrich B F	GR	32.75	26.00	32.00	4.50	16.36	32.75	16.63	.78	.83	-.04	-.75	3.51	-2.13 N	-64.1	-18.0	1.3
Goodyear Tire	GT	33.38	28.50	31.75	1.88	6.28	33.38	17.88	.41	.42	-.67	1.53	3.36	-.61 N	-15.8	4.0	2.7
Mohawk Rub	MWK	23.88	19.13	22.88	2.88	14.38	23.88	13.75	.36	.83	2.32	-11.52	4.17	-.25 N	-6.0	53.0	4.0
Uniroyal Inc	R	11.75	8.88	10.63	1.00	10.39	11.75	5.88	.73	-.54	-.24	-1.52	1.41	-.91 N	-51.4	72.0	2.0
Amerace Corp	AAE	17.50	16.00	17.00	-.25	-1.45	20.38	14.13	-.35	.31	.31	-54.56	3.51	-1.42 N	-40.9	-2.0	3.2
Am Biltrite	ABL	8.00	7.00	7.50	.00	.00	8.63	5.88	.59	1.33	.92	16.67	-.36	1.42 S	NE	NE	-.7
Carlisle Corp	CSL	33.38	26.88	30.25	1.25	4.31	33.38	18.50	.72	-1.19	3.58	-9.96	3.76	-.49 N	-13.4	30.0	8.7
Dana Corp	DCN	35.50	29.00	31.38	.75	2.45	35.50	21.88	.32	.20	-1.26	-9.75	3.25	2.28 N	NC	-10.0	4.3
Dayco Corp	DAY	10.13	7.00	9.75	2.13	27.87	13.00	6.25	1.06	.55	-3.33	-7.09	1.13	-.89 N	-98.8	-55.0	1.1
Grt Amer Ind	GRI	15.38	14.25	14.50	-.38	-2.52	16.63	11.00	.15	.58	1.97	30.63	3.87	-1.93 N	-45.4	4.0	4.3
OSullivan Cp	OSL	21.13	19.75	21.13	1.13	5.63	21.13	12.16	.08	.82	1.21	42.11	1.80	.18 N	10.4	14.0	7.3
Pantasote Inc	PNT	4.50	2.50	3.00	.25	9.09	4.50	2.50	1.11	-3.53	.03	-40.38	-.02	-1.18 N	-245.8	-33.0	-.1
Plymth Rub A	PLRA	2.88	2.38	2.63	.13	5.00	3.63	2.00	.46	.00	1.84	-67.19	.38	-1.07 N	-159.7	80.0	.9
Plymth Rub B	PLRB	2.63	2.13	2.63	.25	10.53	3.38	1.75	.71	3.75	-.77	-19.05	NA	NA	NA	NA	NA
Rubbermaid	RBD	55.75	48.00	54.00	4.00	8.00	55.75	34.88	.25	.23	1.86	10.47	3.31	.31 N	9.8	10.0	7.2

(KEY: NA—Not Applicable NC—Not Calculable NE—Negative Earnings)
Q—First quarter S—Six months N—Nine months F—Fiscal year
**—Other than a quarterly multiple resulting from a fiscal year change*
Table prepared by Media General Financial Services, Richmond, Va. 23261

General Tire discontinued operations at its seven domestic retread plants. The company announced intentions on selling the facilities in August and said it is still pursuing buyers. Total employment at the seven plants was 124.

The United States International Trade Commission released a report indicating the net positive balance of trade for miscellaneous rubber and plastics products declined almost 35% during the period from 1977 through 1981. Imports increased 81% from $500 million in 1977 to $905 million in 1981. Exports increased 36% from $816 million to $1.1 billion. Major U.S. markets were Canada and Mexico while the major sources of imports were Canada and Taiwan. U.S. consumption increased from $26.7 billion to $30.9 billion for the products listed which fall under the classifications rubber and plastic hose and belting, fabricated rubber products, not elsewhere classified and miscellaneous plastics products.

A task force is developing a standard test method to help evaluate fire retardant additives used in rubber related materials. Committee D-11 on rubber and its subcommittee on Flammability of ASTM is developing the standard. The proposed standard test would be a means of measuring the burning rate of rubber materials under controlled laboratory conditions, using a horizontal open flame test.

Hercules successfully completed a full-scale production run to produce wood rosin, utilizing treated stumps at its Hattiesburg, MI plant.

Dr. Alfred Marzocchi, a senior research fellow with Owens-Corning Fiberglas, received the Midgley Medal from the Detroit section of the American Chemical Soci-

Summary

P/E	DIVIDENDS			FINANCIAL POSITION					
							(Last Fiscal Year) Per Share		
P/E Ratio Today	Indicated Dvd. Rate Amt.	Yield	Last X Dvd. Date	(Last Fiscal Year) In $Millions Revenue	Earnings	Current Ratio	Long Term Debt	Stock Equity	Last Bal. Sheet Date
	$	%		$	$		$	$	
6.3	.00	.0	00-00-00	168.4	4.5	2.4	1.81	3.21	1281
NE	.00	.0	06-28-82	69.7	.5	1.2	1.89	6.12	1281
6.8	.80	3.1	11-29-82	560.5	16.6	2.2	22.10	31.88	0981
12.7	.90	2.5	09-14-82	312.5	33.5	4.2	1.02	14.80	1281
7.8	.64	1.9	08-30-82	393.9	17.3	2.3	10.19	19.17	1281
NE	.00	.0	05-26-81	9405.8	-26.5	1.4	.00	1.14	1281
20.1	.60	3.8	09-29-82	4361.0	79.0	1.7	7.21	25.00	1081
10.2	1.50	5.5	11-03-82	2175.2	65.9	1.9	10.53	43.75	1181
26.9	1.56	4.9	08-30-82	3184.6	42.1	1.9	42.17	61.79	1281
9.8	1.40	4.4	11-08-82	9152.9	243.9	2.1	16.06	32.96	1281
5.9	.90	3.9	11-29-82	211.0	8.5	2.4	7.08	24.07	1281
12.4	.00	.0	08-22-78	2260.1	45.3	2.3	17.78	17.14	1281
8.3	1.32	7.8	09-24-82	320.0	10.2	3.1	19.01	44.76	1281
NE	.30	4.0	09-20-82	137.1	-1.0	1.8	2.93	15.44	1281
9.6	.92	3.0	11-12-82	406.3	35.3	2.8	4.36	14.28	1281
13.8	1.60	5.1	11-22-82	2711.1	115.6	2.3	10.95	28.22	1281
975.0	.16	1.6	10-01-82	787.0	9.0	2.1	28.87	23.63	1081
6.3	.00	.0	00-00-00	144.3	6.2	2.0	8.10	22.60	1281
11.1	.56	2.7	12-09-82	73.7	5.4	3.8	.00	10.52	1281
NE	.00	.0	11-02-81	149.8	-.1	1.8	3.70	8.22	1281
NE	.00	.0	00-00-00	69.6	.6	1.5	.00	7.43	1181
NA	.00	.0	00-00-00	NA	NA	NA	NA	NA	NA
15.6	1.24	2.3	08-09-82	357.1	25.6	2.0	2.05	20.07	1281

information in this table is based on sources believed to be reliable, but its accuracy is not guaranteed. Every effort will be made to correct errors, when discovered in future editions.

ety for outstanding contributions to the automotive industry. Marzocchi is noted for his discovery of the chemical bond between glass fibers and rubber which spearheaded the commercial development of the glass fiber belted bias tires and glass belted radial.

Boy Machines Inc. moved its headquarters to a new 20,000 sq. ft. facility in Lionville, PA.

Financial statements

Aegis Corporation reported a net income of $578,000 for the third period on revenues of $39,959,000.

Cities Service Company, now 45 percent owned by Occidental Petroleum Corporation, reported net income of $25 million for the third quarter.

Earnings of $1,462,000 for the third quarter were posted by **Essex Chemical**. Sales for the period were $40,350,000. L. John Polite, Jr., chairman and chief executive officer, said results for 1982 will be recorded as Essex' second best year of operations.

Exxon Corporation announced a third quarter income of $1,070 million on revenues of $25,331 million.

Third quarter earnings of $34,263,000 were posted by **Freeport-McMoRan**. Sales for the period totaled $186,137.

Goodyear's third quarter earnings were the highest in its history, according to Chairman Charles J. Pilliod, Jr. Earnings of $89 million were reported for the third quarter and sales of $2.16 billion.

Earnings for **Gulf Oil** fell to $146 million for the third quarter, but revenues rose by 1 percent to $7.54 billion.

Hercules reported a third quarter net income of $31.8 million on sales of $602 million.

A third quarter income of $11,943,000 on revenues of $201,200,000 was announced by **Lubrizol**.

Pfizer reported a third quarter net income of $71.5 million. Worldwide sales for the period were $909.6 million.

Standard Products announced a net income of $4,844,000 for fiscal 1982 on sales of $223,321,000.

Third quarter earnings of $818,000 from continuing operations were reported by **Sybron**. Sales from continuing operations for the quarter were $159,256,000.

Uniroyal reported earnings of $4.3 million for the third period on sales of $471 million. Net income for the nine-month period was $31.6 million on sales of $1.5 billion. The company's Tire and Related Products segment reported third quarter operating profit of $17.7 million on sales of $224 million. Operating profit for the Chemical, Rubber and Plastic Materials segment was $10.8 million, with sales of $130 million. Uniroyal's Engineered Products and Services segment reported an operating profit of $400,000 and sales of $118 million for the third quarter.

ENERGY. We can't afford to waste it.

Black producers upgrading facilities, improving product

by Joseph Kuebler, business editor

When you have more capacity than demand for your product, the solution is rather obvious. Production facilities are cut back, plants closed.

That happened in the tire industry in recent years with some 20 factories shutting down, many because the bias-ply tire gave way to the longer-wearing radial.

Less tires means less raw materials, such as carbon black, the reinforcing agent for most rubber products. This has resulted in six carbon black plants being shut down as well as a reduction in operations at most other facilities. As rubber usage goes, so goes carbon black.

In striving to achieve greater efficiency in an era of over-supply and severe competition, producers have dropped as many as 10 grades of black and the chances are that other grades will get the same treatment.

More than one manufacturer is utilizing this slack period to bolster production facilities in anticipation of better days.

"We are in the midst of a program to upgrade our plants," says Norman Tomiello, vice president-marketing for Continental Carbon. "We are getting ourselves positioned for an improved market."

Carbon black consumption is tied so closely to the production of tires and other rubber products that about 95% of the soot-like material is utilized by the rubber industry.

A modest increase in tire demand in 1983 — some estimate it will be 2 or 3% above '82 — would lead to a comparable upturn for the carbon black industry.

While they realize that tires will pull out of the doldrums sooner or later, carbon black producers aren't looking for anything spectacular in 1983.

"We are not holding our breath because we don't think any one crystal ball is that accurate," commented a spokesman for one of the carbon black firms. "It all depends on the rubber shops."

Carbon black shipments from U.S. plants this year are generally estimated at 2.3 billion pounds, the lowest in 13 years. This is more than 30% below the high of 3.39 billion pounds that was established in 1978.

In 1979 shipments dipped 3.4% to 3.28 billion pounds. Then came what proved to be the recession of 1980 when volume dropped to 2.62 billion pounds, down 20%. The 1981 figure of 2.67 billion pounds showed a slight jump of 1.9%.

Currently the effective annual capacity of the U.S. industry has been placed at slightly above 3 billion pounds in contrast to the announced capacity of 3.4 billion pounds.

Some plants have a very large capacity but only a portion is in use. If the facility is down very long, the problem then is the difficulty in getting the equipment back on line because of corrosion.

When equipment is shut down, it deteriorates rapidly since the sulfur in the carbon black, mixed with the moisture in the atmosphere, is damaging to steel. Thus, the longer a

U.S. furnace carbon black facilities

Producer		Capacity
Ashland	Aransas Pass, TX	80
Ashland	Belpre, OH	120
Ashland	New Iberia, LA	260
Ashland	Shamrock, TX	116
Cabot	Franklin, LA	230
Cabot	Pampa, TX	60
Cabot	Villa Platte, LA	305
Cabot	Waverly, WV	180
Columbian	Conroe, TX	100
Columbian	El Dorado, AK	90
Columbian	Mojave, CA	55
Columbian	Marshall, WV	155
Columbian	North Bend, LA	180
Columbian	Hickock, KS	60
Continental Carbon	Phenix City, AL	55
Continental Carbon	Ponco City, OK	132
Continental Carbon	Sunray, TX	98
J.M. Huber	Baytown, TX	235
J.M. Huber	Borger, TX	120
Phillips	Borger, TX	275
Phillips	Orange, TX	135
Sid Richardson	Addis, LA	123
Sid Richardson	Big Spring, TX	108

Millions of pounds annually

plant stands idle, the more problems the manufacturer faces when he tries to put it back on line.

An executive of another producer feels 1983 has to be better than '82 but how fast the turnaround comes is a question that is not easily answered.

"The problem with the carbon black industry is that there is too much capacity for present consumption, even with the six plant shutdowns," he insists. "More capacity has to go. I look for some consolidations."

He figures the industry was running at 60% in early November, the same rate as it was earlier in the year. Considering the effective capacity at a little over 3 billion pounds, however, the capacity utilization for the year will be around 77%.

The marketing manager for one company believes, that if business should pick up substantially, "every carbon black firm is capable of expanding existing facilities adding another reactor or two."

"I don't see any need for expansion, though, for four or five years," he added.

Shipment of blacks for the first half of 1982 declined 13% from 1981, the lowest semi-annual period since the second half of 1970, according to the quarterly industry summary compiled by Columbian Carbon. Grade N-500 (FEF) had its lowest half-year in 19 years, and grade N-700 (SAF) had its poorest half in 32 years.

First half production of all blacks was the lowest semi-annual output in seven years and was 16% below the same period in '81.

Inventory at the plants increased 7% during the second quarter to 106,000 metric tons, an estimated 1.2 month supply.

Occasionally the industry's critics can be found in its own ranks. Larry Creedon of Ashland Chemical, for example, contends that for the most part, carbon black manufacturers have been preoccupied with production.

"We have concentrated more on our efforts on improving manufacturing techniques than on improving the product itself," he told the Southern Rubber Group in Memphis, TN last month.

"The prospect for reduced operating costs, coupled with increased output is a tantalizing combination few companies can resist," he added. "That's fine, but as more emphasis is put on production, marketing is often neglected."

"The prospect for reduced operating costs, coupled with increased output is a tantalizing combination few companies can resist."

He describes marketing as an ongoing process that includes research to determine what products and services the customer wants. Creedon is sales-marketing coordinator, North America, for Ashland's carbon black division.

Meanwhile the move by producers to reduce the number of grades of carbon black in an effort to achieve greater output efficiency and lessen inventory problems is gaining momentum.

Continental Carbon says it is going through a grade rationalization program to further improve efficiency during a weak market period.

"In the last few years we have reduced our product line from 24 or 25 down to 14," Tomiello, the marketing vice president noted.

"Our objective now is to further intensify our efforts in R&D to improve and modify our products to serve the customer better."

At J.M. Huber Corp., various grades have been dropped as they became obsolete, a company executive pointed out.

"In our rationalization we are trying to reduce the overall number of carbon black grades down to a more manageable level," he said.

In every instance producers indicated their objective was to keep operating costs at the lowest level practical in hopes of alleviating the squeeze on selling prices.

Ashland announced recently that it will phase out nine low-volume car-

I. Carbon Black Industry in the U.S.A.
(Metric Tons)

		1982		Percentage Change	
		2nd Qtr.	1st Half	2nd Qtr. '82 vs. 2nd Qtr. '81	1st Half '82 vs. 1st Half '81
N-100 (SAF)	Prod.	4,904	9,162	−24.5%	−15.3%
	Ship.	4,081	8,365	−23.2%	−20.3%
N-200 (ISAF)	Prod.	26,023	55,275	−27.4%	−22.7%
	Ship.	24,777	55,168	−24.0%	−20.3%
N-300 (HAF)	Prod.	117,127	235,273	−7.3%	−11.5%
	Ship.	113,347	234,646	−1.4%	−8.8%
N-500 (FEF)	Prod.	24,248	53,485	−29.3%	−24.0%
	Ship.	26,215	55,224	−17.9%	−19.3%
N-600 (GPF)	Prod.	69,595	141,870	−7.1%	−10.2%
	Ship.	63,326	136,499	−8.0%	−10.1%
N-700 (SAF)	Prod.	21,443	47,796	−42.4%	−31.4%
	Ship.	24,798	51,299	−23.4%	−22.2%
Total	Prod.	263,339	542,861	−16.2%	−16.0%
	Ship.	256,544	541,201	−10.3%	−13.2%
Domestic Shipments (Included Above)		249,697	525,892	−9.0%	−11.6%
Domestic Share		94.8%	96.9%		

II. SBR Black Rubber Production
(Metric Tons)

	1982		Percentage Change	
	2nd Qtr.	1st Half	2nd Qtr. '82 vs. 2nd Qtr. '81	1st Half '82 vs. 1st Half '81
Net Polymer	41,058	74,015	+13.1%	−10.4%
Oil	16,756	31,392	+23.8%	−0.8%
Oil % of Net Polymer	40.8%	42.4%		
Net Rubber	57,814	105,407	+16.0%	−7.8%
Net Rubber % of Dry SBR	29.2%	25.2%		
Carbon Black	21,158	44,313	−14.1%	−20.9%
Total SBR Black Rubber	78,972	149,720	+6.0%	−12.1%

bon black grades during 1983.

The company said that all these grades have been produced in relatively low volumes, with little prospect for increased sales.

The cutback in grades doesn't bother rubber product manufacturers, at least Armstrong Rubber.

"The grades that are available are the grades we want," adds John F. Sayre, Armstrong's director of purchases.

The cooperative effort of both rubber and black manufacturers is the one essential factor necessary to solve the multiplicity of grades problem, says James A. Myers, senior vice president of Ashland's black division.

He believes some 10 primary furnace blacks utilized by the rubber industry could meet the vast majority of user requirements. They would do the job of the 50 or more grades with specification variances sometimes so insignificant as to be almost immeasurable, Myers added.

In contrast to the troubles of the furnace black producers, the smaller thermal black industry is in a different ball game.

"Our business is holding up fairly well when compared with furnace blacks," reports Robert Gaines, sales manager for Cancarb Ltd. Thermal black is used largely in seals, gaskets and wire and cable.

Legal Corner

DHHS/FDA

•**Indirect food additives:** Food and Drug Administration has amended 21 CFR Parts 178 and 175 dealing with indirect food additives. The food additive regulations have been amended to provide for the safe use of tris (2,4-di-*tert*-butylphenyl) phosphite as an antioxidant and/or stabilizer for certain olefin polymers, without temperature limitations, intended for food-contact use (Part 178), and to provide also for the safe use of butadiene-styrene-divinylbenzene copolymer in can end cements (Part 175).

Additional data available from: Bureau of Foods (HFF-334), Food and Drug Administration, 200 C St. SW., Washington, DC 20204.

EPA

•**Test method revisions:** Environmental Protection Agency has revised 40 CFR Part 61 as follows. Appendix B, Test Methods 106 and 107 were revised and Method 107A added to require and allow, respectively, all sources of vinyl chloride specified to conduct emission tests under Subparts A and F (Part 61) to hereafter use these methods to determine compliance.

Also revised were Appendix C, Quality Assurance Procedures 1 and 2: Procedure 1, to provide a method to determine gas chromatograph (GC) column resolution; Procedure 2, to provide a method for auditing GC sample analysis.

For further details: Roger T. Shigehara, Emission Measurement Branch, Emission Standards and Engineering Division (MD-19), U.S. Environmental Protection Agency, Research Triangle Park, N.C. 27711.

DOT/NHTSA

•**New tire sizes:** National Highway Traffic Safety Administration has amended Federal Motor Vehicle Safety Standard No. 109 — New Pneumatic Tires — Passenger Cars — to add the following new tire size designations, permitting their introduction into interstate commerce: 200/55R290 ("55" Series All Millimetric Radial Ply Tires for (TR or JM Rims); —185/65R365 ("P/65" Series ISO Type Tires); T115/90R13 (T "90" Series 60 Lb/In² Tires); T95/110R13, T95/110R14, T95/110R15, T115/110R13, T115/110R14, T115/110R15 (T "110" Series 60 Lb/In² Tires); 175R16 ("R" Type Radial Ply Tires); 215/80R16 ("Series" "R" Type Radials).

For further details: John A. Diehl, Office of Automotive Ratings, NHTSA, 400 Seventh Street, SW., Washington, D.C. 20590.

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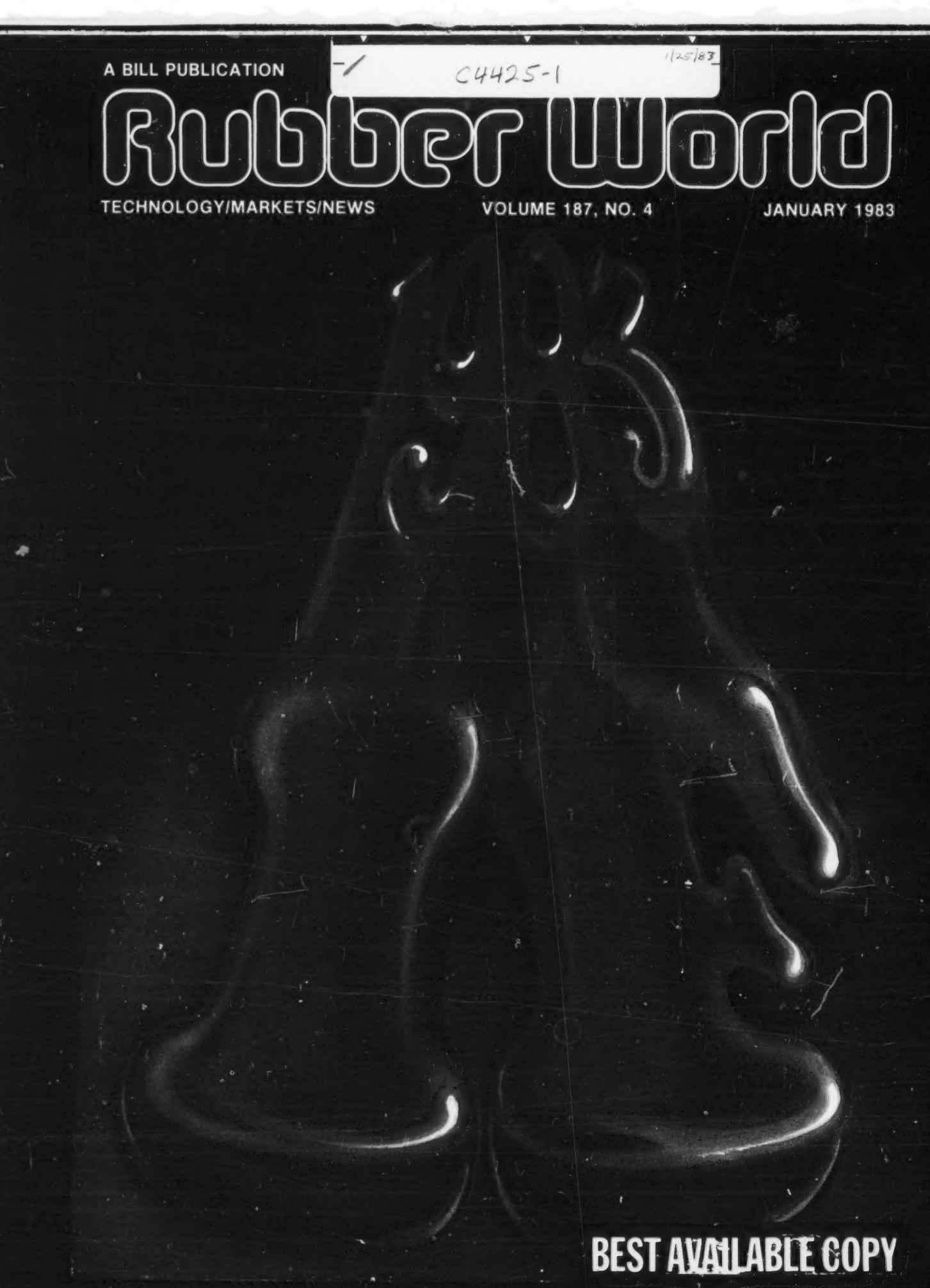

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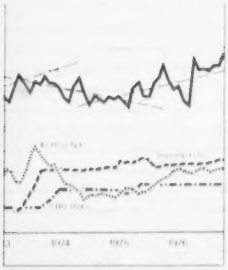

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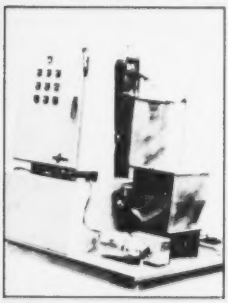

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Cover artwork by Akron artist Mary Myers.

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Business Briefs

Acquisitions, expansions

Sheller-Globe Corp. will only purchase certain assets pertaining to the automotive business of the Olsonite Corp. for cash and assumption of a portion of Olsonite's long-term debt. In June, the two companies announced an agreement in principle for Sheller-Globe to purchase all the shares of Olsonite.

Application Engineering has moved into its new 122,000 square foot building in Wood Dale, IL. The facility will be used to manufacture water chillers, temperature control units, cooling towers, water recovery systems and robotic equipment.

Armstrong purchased 500,000 shares of its own common stock from the David T. Chase family for $25 per share to hold as treasury stock.

International Robomation/Intelligence has moved its corporate headquarters into a 42,000 square foot building in Carlsbad, CA.

National Starch and Chemical Corp. has formed a marketing group, Performance Chemicals, which will assume the sales, marketing, research and development functions for its reactive monomer and specialty chemical product lines, and custom manufacturing services.

Hy-Cal Engineering has moved to a new facility in El Monte, CA that has three times more floor space for engineering and manufacturing.

A new high pressure process for production of linear medium-to-low density polyethylene has been developed by **Montepolimeri** (Montedison Group) which can be extended to any low density polyethylene plant operating at high pressure.

Resinall Corp. has completed its new research and development lab at its production complex in Severn, NC.

Gates Energy Products purchased a building in Warrensburg, MI for a battery manufacturing operation. Total project cost is targeted at $9.6 million, including remodeling and expansion of the building and production equipment costs.

The Roquette Corp.'s new sorbitol plant in Gurnee, IL will begin production this month. The new plant is the first stage of a complex of modules which will produce a complete line of liquid sorbitol and polyols. The second module, to be built later this year, will add the capacity to manufacture crystalline sorbitol.

RMA monthly tire shipments & production report through September 1982 (Figures in Thousands of Units)

Passenger Tires	YTD 1982	YTD 1981	% Change
Shipments			
Original Equipment	25,907	28,451	−8.94
Radial	21,692	23,688	−8.35
Replacement	99,937	96,459	+3.61
Radial	64,722	57,678	+12.21
Export	2,125	3,067	−30.71
Radial	1,140	1,853	−38.48
Total	127,969	127,977	−0.01
Radial	87,554	83,199	+5.23
Production	113,803	115,076	−1.11
Radial	77,517	73,690	+5.19

The Government of India is setting up a new plant known as Diesel Component Works which will necessitate the manufacture of sophisticated and intricate rubber components for application on diesel and electric locomotives as well as the coaching stock. An agreement for a transfer of technology with a leading rubber manufacturer or suitable partner is sought.

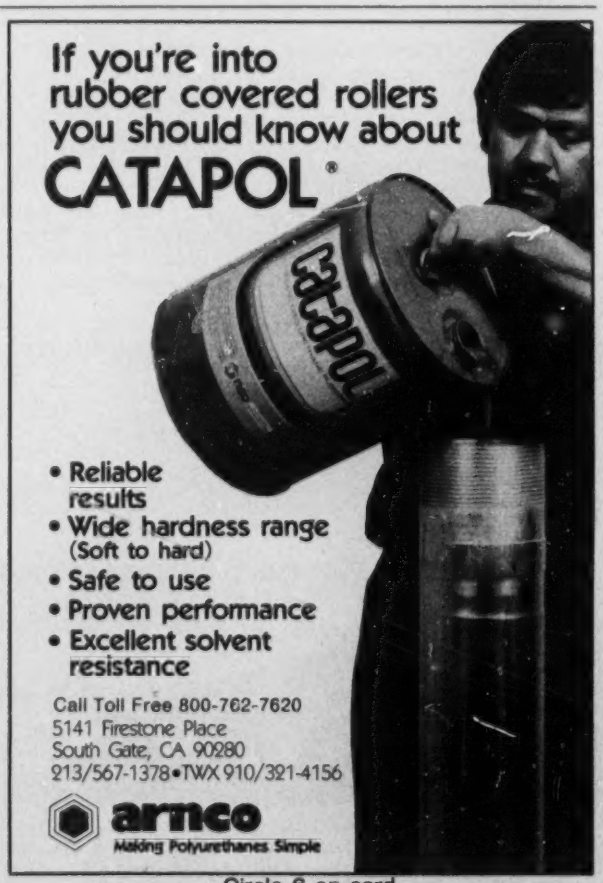
Union Carbide made a major increase in the compounding capacity of its engineering plastics plant located in Marietta, OH.

Contracts, licenses

Goodyear has been awarded a $7.3 million contract by the U.S. Marine Corps to produce nearly 170 miles of fuel hose for tactical fueling of helicopters and jets. The contract is the largest single hose sale in the company's history.

General Tire was named prime tire supplier by **Nissan USA** for its new light truck assembly plant in Smyrna, TN. Initial production will supply 500,000 tires.

Herbert Products Inc., Westbury, NY signed an agreement with Wallace Knight Ltd., Slough, England, to be exclusive agent in North America for the sales and service



Circle 6 on card

Rubber World Stock

Name	Symbol	PRICE High	Low	Close	Change Amt	Change Pct	52 Week High	52 Week Low	TREND TO MARKET Price Trend (% per day) Last 30 Days	Price Trend Last 5 Days	Volume Trend (% per day) Last 30 Days	Volume Trend Last 5 Days	Last Fiscal Year	EARNINGS/SHARE Latest 12 Months vs Preceding 12 Months Change Amt	Change Pct	5 Year Annual Growth Rate	Profit Margin
		$	$	$	$	%	$	$	%	%	%	%	$	$	%	%	%
Tires and Inner Tubes																	
Aegis Corp	AO	2.63	2.25	2.25	-.25	-10.00	3.00	2.00	-.38	-.40	-2.65	8.02	.42	.07 N	21.2	5.0	2.7
Alliance Tire	ATRA	9.75	6.13	8.88	2.38	36.54	12.75	6.00	1.31	-.13	6.01	.27	.02	-1.62 N	-170.5	-21.0	.7
Armstrong Rub	ARM	29.50	23.50	28.00	3.00	12.00	29.50	14.00	.71	-.20	1.34	-19.31	3.93	-.29 F	-6.8	-1.0	2.7
Bandag Inc	BDG	39.38	36.50	36.50	-.25	-.68	38.38	20.75	.29	.50	-4.10	-27.28	2.76	.09 N	3.2	16.0	10.7
Cooper Tire	CTB	34.75	29.50	33.63	2.13	6.75	34.75	13.88	.24	.35	5.32	-29.36	4.05	-.20 N	-4.4	29.0	4.4
Dunlop Holding	DLP	.94	.63	.69	-.25	-26.67	1.50	.63	-.77	-.42	5.71	-7.06	-.04	.00 F	NE	-24.0	-.3
Firestone Tire	FIR	17.50	15.50	17.00	1.25	7.94	17.50	9.75	.53	.59	-2.90	14.89	1.36	-.22 N	-21.7	-25.0	1.8
Gen Tire	GY	27.88	24.75	26.38	-1.00	-3.65	29.00	17.88	-.25	.27	-4.78	-10.76	2.63	-.33 N	-10.9	-16.0	3.0
Goodrich B F	GR	32.88	29.75	30.63	-.50	-1.61	32.88	16.63	.15	-.45	-4.87	20.71	3.51	-2.13 N	-64.1	-18.0	1.3
Goodyear Tire	GT	34.50	30.88	31.38	-.88	-2.71	34.50	17.88	.20	-.10	.30	44.36	3.36	-.61 N	-15.8	4.0	2.7
Mohawk Rub	MWK	24.88	21.75	24.13	1.50	6.63	24.88	13.88	.47	.96	-.17	-.55	4.17	-.25 N	-6.0	53.0	4.0
Uniroyal Inc	R	11.13	10.00	10.63	-.13	-1.16	11.75	5.88	-.07	2.06	-6.13	5.84	1.41	-.91 N	-51.4	72.0	2.0
Rubber Products																	
Amerace Corp	AAE	17.50	16.25	17.00	.00	.00	20.38	14.13	-.02	1.08	-1.19	-30.61	3.51	-1.42 N	-40.9	-2.0	3.2
Am Biltrite	ABL	8.25	7.38	8.00	.25	3.23	8.25	5.88	.33	1.07	-2.15	-7.35	-.36	-.81 N	-132.7	NE	-.7
Carlisle Corp	CSL	34.75	30.50	30.75	-.88	-2.77	34.75	18.50	.29	-.68	-2.89	4.15	3.76	-.49 N	-13.4	30.0	8.7
Dana Corp	DCN	33.75	31.00	32.13	.13	.39	35.50	21.88	-.09	.48	-4.15	-.41	3.25	2.28 N	NC	-10.0	4.3
Dayco Corp	DAY	9.88	9.13	9.38	-.63	-6.25	13.00	6.25	.14	1.21	-5.10	-5.34	1.13	-.89 N	-98.8	-55.0	1.1
Grt Amer Ind	GRI	14.63	13.00	13.13	-1.38	-9.48	16.63	11.00	-.29	-.69	-2.16	-27.19	3.87	-1.93 N	-45.4	4.0	4.3
OSullivan Cp	OSL	21.50	20.50	21.50	.38	1.78	21.50	12.16	.13	1.66	-2.54	-12.50	1.80	.18 N	10.4	14.0	7.3
Pantasote Inc	PNT	3.00	2.63	2.75	-.25	-8.33	4.50	2.50	-1.12	.34	2.40	-37.21	-.02	-1.18 N	-245.8	-33.0	-.1
Plymth Rub A	PLRA	2.75	2.25	2.25	-.38	-14.29	3.50	2.00	-.14	-1.91	.56	-62.05	.38	-1.07 N	-159.7	80.0	.9
Plymth Rub B	PLRB	2.63	2.25	2.25	-.25	-10.00	2.75	1.75	.04	-.39	-2.56	66.67	NA	NA	NA	NA	NA
Rubbermaid	RBD	32.00	26.19	30.75	4.63	17.70	32.00	17.44	.56	.39	.65	-6.57	1.66	.15 N	9.4	10.0	7.2

(KEY: NA—Not Applicable NC—Not Calculable NE—Negative Earnings)
Q—First quarter S—Six months N—Nine months F—Fiscal year
**—Other than a quarterly multiple resulting from a fiscal year change*
Table prepared by Media General Financial Services, Richmond, Va. 23261

mers will also be raised between 5.5 and 7%, PVP K-30, for example, will be priced at $3.11 per pound for truckload drum quantities, a 20¢ increase. Prices for GAF's Gantrez polymer line will go up an average of 6.5%.

Markets, news

Du Pont shut down its chloroprene monomer plant in Victoria, TX and consolidated domestic manufacture of the product at La Place, LA. The consolidation will result in significant cost savings and logistical advantages according to Du Pont.

General Tire's board of directors elected Warren Hayford president and chief operating officer, replacing M.G. O'Neil in those positions. O'Neil will remain as chairman of the board and chief executive officer.

The 1982 consumption of antioxidants/antiozonants in the U.S., excluding their uses in lubricants, functional fluids and fuels, is expected to exceed 250 million pounds valued at more than $650 million. By 1988 the U.S. consumption of these chemicals is projected to reach 325 million pounds and a value of $1 billion according to Chemical Business Development Co. of Montclair, NJ.

Government approval of polyester bottles for liquor could result in additional annual sales of 60-to-75 million pounds of polyethylene terephthalate resin by 1985, Goodyear predicts. Currently, sales of PET bottle resin are approximately 450 million pounds annually.

A Malaysian university lecturer and a crops specialist from China were awarded consolation prizes for their en-

Summary

P/E	DIVIDENDS			FINANCIAL POSITION					
				(Last Fiscal Year) In $Millions			(Last Fiscal Year) Per Share		
P/E Ratio Today	Indicated Dvd. Rate Amt.	Yield	Last x Dvd Date	Revenue	Earnings	Current Ratio	Long Term Debt	Stock Equity	Last Bal Sheet Date
	$	%		$	$		$	$	
5.6	.00	.0	00-00-00	168.4	4.5	2.4	1.81	3.21	1281
NE	.00	.0	06-28-82	69.7	.5	1.2	1.89	6.12	1281
7.1	.80	2.9	11-29-82	560.5	16.6	2.2	22.10	31.88	0981
12.7	.90	2.5	12-15-82	312.5	33.5	4.2	1.02	14.80	1281
7.8	.64	1.9	08-30-82	393.9	17.3	2.3	10.19	19.17	1281
NE	.00	.0	05-26-81	9405.8	-26.5	1.4	.00	1.14	1281
21.5	.60	3.5	09-29-82	4361.0	79.0	1.7	7.21	25.00	1081
9.8	1.50	5.7	11-03-82	2175.2	65.9	1.9	10.53	43.75	1181
25.7	1.56	5.1	11-29-82	3184.6	42.1	1.9	42.17	61.79	1281
9.7	1.40	4.5	11-08-82	9152.9	243.9	2.1	16.06	32.96	1281
6.3	.90	3.7	11-29-82	211.0	8.5	2.4	7.08	24.07	1281
12.4	.00	.0	08-22-78	2260.1	45.3	2.3	17.78	17.14	1281
8.3	1.32	7.8	09-24-82	320.0	10.2	3.1	19.01	44.76	1281
NE	.30	3.8	09-20-82	137.1	-1.0	1.8	2.93	15.44	1281
9.8	.92	3.0	11-12-82	406.3	35.3	2.8	4.36	14.28	1281
14.1	1.60	5.0	11-22-82	2711.1	115.6	2.3	10.95	28.22	1281
937.5	.16	1.7	12-28-82	787.0	9.0	2.1	28.87	23.63	1081
5.7	.00	.0	00-00-00	144.3	6.2	2.0	8.10	22.60	1281
11.3	.56	2.6	12-09-82	73.7	5.4	3.8	.00	10.52	1281
NE	.00	.0	11-02-81	149.8	-.1	1.8	3.70	8.22	1281
NE	.00	.0	00-00-00	69.6	.6	1.5	.00	7.43	1181
NA	.00	.0	00-00-00	NA	NA	NA	NA	NA	NA
17.8	.64	2.1	12-01-82	357.1	25.6	2.0	1.02	10.03	1281

ormation in the table is based on sources believed to be reliable, but its accuracy is not anteed. Every effort will be made to correct errors, when discovered in future editions.

tries in the MRRDB-sponsored competition to determine the dry rubber content of field latex. None of the 63 entries from 12 countries was considered to have fully met the conditions as required by the contest rules. The two entries chosen were considered as the best contributions toward finding a new and improved method for accurately and conveniently determining the dry rubber content of field latex.

Despite a disappointing 1982, the nation's chemical industry is optimistic that there will be an upturn in the economy and expects to make a strong recovery in 1983, according to a survey conducted by the Chemical Manufacturers Association. To support this optimism, the industry's spending on research and development in 1982 is likely to reach an all-time high of $5.7 billion, a 16.9% increase over 1981 and larger than the annual 14% rise experienced over the last five years. The survey results, along with a review of chemical industry performance in 1982, were released by CMA during its annual economic briefing. Myron T. Foveaux, the Association's Trade and Economic Policy Advisor, noted that during 1982, while some commodity chemicals suffered setbacks, many specialty chemical sectors held sales and earnings at a generally satisfactory level. Foveaux said that based on estimates, it now appears that chemical sales for 1982 will be $172.4 billion, a 1.5% drop from 1981. Net income will be about $10.7 billion, 15.1% lower than last year and about equal to 1979.

Financial statements

AccuRay Corporation reported a net income of $1,003,000 for the third quarter on operating revenues of $25,700,000.

American Biltrite reported a net loss from continuing operations of $119,000 for the third quarter. Sales for the period were $27,508,000.

Armstrong Rubber reported earnings of $4.1 million for the fourth quarter on sales of $143.6 million. Earnings for the year were $17 million and yearly sales were $575.9, which includes sales of $125.7 million of Copolymer Rubber and Chemical Corp., a consolidated subsidiary.

BASF world sales for the first three quarters totaled $10,749 million. Their earnings for the period were $278 million.

Brad Ragan reported a net income of $421,000 for the second quarter. Revenues for the period were $43,336,000.

Cabot Corporation reported a fourth quarter income of $11,091,000. Sales and other operating revenues for the period were $364,172,000. Net income for the fiscal year was $88,007,000, with total sales and operating revenues of $1,587,658,000.

Carlisle Corporation reported net earnings of $6,558,000 for the third quarter on sales of $92,595,000.

Compo Industries reported fourth quarter revenues of $21,934,000. Income for the quarter was $197,000.

Crompton & Knowles Corporation reported net third quarter earnings of $644,000, with sales of $52,305,000.

Firestone reported a net fourth quarter income of $20 million, with sales of $972 million. Firestone's annual earnings for fiscal 1982 were $6 million on sales of $3.9 billion. Group operating income for 1982 totaled $251 million: world tire group $188 million, sales and marketing operations group, $41 million, and diversified products group, $22 million. The company said that these declines in operating group income were attributable in large part to severely depressed production levels in the automobile industry and weak economies in the U.S. and most of the foreign countries where Firestone operates.

BFGoodrich reported a net loss of $100,000 on sales of $795.4 million for the third quarter. The tire group had third quarter operating income of $24.3 million on sales of $341.9 million. The chemical group reported a loss of $1.0 million on sales of $258.9 million and the engineered products group had operating income of $8.0 million on sales of $194.6 million for the third quarter.

Park-Ohio reported a third quarter net income of $2,737,000 on sales of $40,135,000.

Petrolane reported a net income of $18,093,000 for the fourth quarter on sales of $452,882,000.

Forecasts on the performance of the rubber industry over the next 12 months seem to have a singular thread wound through each one and that thread is called *if*. *If* is not generally accepted in forecasting, prognosticators should be able to tell what will transpire along with why and how.

But forecasting, which was once believed to be a science, has now slipped to the art stage with *if* playing the lead in most of these hit or miss productions. Only a few short years ago, predicting the actions of the rubber industry over a certain time frame consisted of following historical growth rates and projecting them out through the period. The last couple of years have showed this method is no longer accurate, fueling a false sense of optimism in some areas and much confusion in others. One thing is certain, no two forecasters are predicting the same results, which was the case in the past.

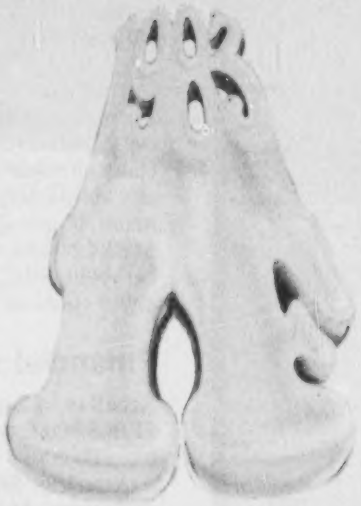
It is fair to say that many forecasts during the past two years were considerably off the mark, for many reasons. Primarily, no-one calculated the depth or breadth of the economic recession we are now experiencing. Two of the main statistical bodies of the rubber industry, the Rubber Manufacturers Association, and the International Institute of Synthetic Rubber Producers, have continually modified their projections during this period.

The uncertainties in the economic climate in the U.S. and worldwide have made the word *if* part of almost all economic forecasts and the rubber industry is no exception.

Automotive

The biggest *if* facing the rubber industry deals with automotive, where more than half of the rubber manufactured is consumed. *If* the domestic auto industry turns around, the rubber industry will ride right along with it. But will 1983 see any change in new car sales? Will a new gas tax offset any decreases in the price of gasoline and therefore not increase the average of miles driven?

RMA president Donald Brotzman believes a recovery in the automobile industry is in the offing, one that will pick up the general overall economy as well. "Our statistical experts believe that the worst is over, that the recession has bottomed out and that our industry has begun a slow recovery along with the automobile industry and business in general. We expect this gradual improvement to continue," Brotzman stated at a recent RMA meeting.



New car sales could reach 9.1 million in 1983 according to a recent poll by the National Association of Business Economists. This would be a considerable increase over the near 8 million domestic and foreign cars sold in 1982, and the most optimistic projection. Most of the major automobile manufacturers are forecasting an increase in sales due to what they consider a "pent up demand." But their projections call for sales of around 8.5-9 million cars, or near 1981 levels.

The RMA forecasts a 19.7% growth in the original equipment passenger tire market, from 35.5 million units in 1982 to 42.5 million in 1983. Similar growth is expected in 1984, with an 18.4% increase to 50.3 million. The replacement tire market is expected to grow slightly from 129 million in 1982 to 130 million in 1983. Similar increase is predicted for 1984, to 131 million units.

Growth is also predicted for truck and bus tires, with original equipment shipments increasing 16% in 1983, from 5.6 million to 6.5 million. An increase of 9.2% is seen for 1984, to 7.1 million units. In the replacement market, 1983 shipments will reach 29.7 million, a 6.5% increase from the 27.9 million shipped in 1982. Predictions for 1984 are 31.2 million, a 5% increase. RMA also forecasts growth for tractor and implement tires, production rising slightly from 3.2 million in 1982, to 3.9 million in 1983 and 4.5 million in 1984.

1982 Automotive tire shipments remained fairly even with 1980 and 1981 figures of about 175 million tires, according to the Commerce Department. The value of shipments has remained about $9 billion since 1977 when 215 million tires were produced even though prices have increased 50%. Exports have grown 70% since 1977, from $300 million to $500 million and imports have increased from $850 million to $1.2 billion.

The replacement automotive market for rubber products also faces a big *if*. Should new car sales pick up dramatically, the replacement market will probably see less growth. A continuation of the past couple of years however, could mean a banner year for automotive rubber replacement parts.

Retail sales of replacement belts and hose will reach an all-time high of more than $870 million in 1983, according to Goodyear estimates.

People are keeping their cars longer and, with fuel prices stabilizing, they are driving more. In 1970 the average age of automobiles was 5.5 years and it increased to 7.0 years in 1982.

"Import cars that earned a significant market share in the late 1970s and early 1980s are now coming into their replacement parts age and will boost aftermarket belts and hose sales," said Paul J. Foley, manager of automotive replacement products for Goodyear.

Foley said unit sales of V-belts and hose will increase 5 to 7% in 1983, after gains of 7% and 6% in 1981 and 1982, respectively. RMA's industrial products forecast predicts the demand for hose growing from $845 million in 1982 to $870 million in 1983 and $915 million in 1984. This includes all reinforced hose, both rubber and plastic (except garden hose).

RMA forecasts a slight increase in the V-belt market, *if* the automotive industry begins to pick up, growing from $400 million in 1982 to $415

by Don R. Smith

and Murl Pace

million in 1983 and $435 million in 1984.

Flat-belting demand will also grow, with 1983 forecasts of $345 million, compared to $335 million in 1982. Another slight increase is expected in 1984 with demand growing to $360 million. The RMA includes all power transmission belts, industrial and automotive, rubber or plastic, in this category of original and replacement equipment. The Commerce Department forecasts the hose and belting market will fluctuate along with general economic changes, but should continue overall growth of "at least 4% annually to 1987." Overall, the hose and belting industry, including original equipment and the automotive aftermarket, will grow about 10% in 1983, says the Commerce Department.

The decline in automotive production and the low level of industrial activity have had an adverse effect on shipments of industrial goods. Shipments have been dropping since 1980. Molded, extruded and lathe-cut mechanical goods account for 35-50% of the fabricated rubber products market, which declined 2% in 1981. Shipments in this area were down another 9% last year, according to Commerce.

Since these goods supply the automotive market and are used primarily in new automobile production, the replacement market represents only a small segment. Thus, an improvement in this area is dependent on an upturn in automotive production and a general upswing in the economy. Given a modest growth in these areas, Commerce says fabricated rubber products should grow almost 8% in 1983. Long-range growth of about 3% annually to 1987 is forecast.

RMA Industrial products market forecast
(Figures are in millions of 1982 dollars)

	1982	1983	1984	1985	1986	1987
Hose	845	870	915	955	990	1025
Flat Belting	335	345	360	370	380	390
V-Belts	400	415	435	450	465	475

The RMA forecasts slight growth in all mechanical rubber products, with demand for these goods growing from $1,649 billion in 1982 to $1,825 billion in 1983.

"After a couple of years of rapid growth, petroleum exploration in the U.S. has been curtailed sharply and prospects of imminent growth looks bleak at best."

Breaking down this total, RMA says demand for molded goods is expected to grow from $1,286 billion in 1982 to $1,429 billion in 1983. Demand for extruded goods will rise from $209 million in 1982 to $337 million in 1983. And lathe-cut goods will also increase in demand from $54 million in 1982 to $59 million in 1983.

Non-automotive

The major non-automotive markets for the rubber industry, mining, energy production and construction, each have certain sub sections which are strong and where good growth is predicted, but on a whole they mirror the general economic picture with all of the *ifs* involved.

Like most other segments of the economy, 1983 appears off for mining in general. Limited demand has results in one of the deepest depressions in 30-40 years which has led to the postponement of developing new mines, the shutdown of less profitable ones and delays in purchases of new equipment.

A report by Frost & Sullivan projects a turnaround in the mining industry but it is vague as to when it will actually take place. 1983 doesn't appear to be the time but the study says by 1985 the sales of mining equipment will rise markedly and should nearly double by the end of the decade. Industry revenues which were about $3.9 billion in 1982 are expected to reach nearly $7 billion by 1990.

Frost & Sullivan see surface mining equipment sales growing from $2.9 billion this year to over $5.3 billion in 1990. Underground mining equipment, which has been declining in sales volume by 2% annually since 1975, is expected to grow from $662 million this year to $1.2 billion by decades end, the study says. Mineral beneficiation equipment, the smallest segment of the industry, is projected to increase from $365 million in 1983 to $584 million in 1990.

After a couple of years of rapid growth, petroleum exploration in the U.S. has been curtailed sharply and prospects of imminent growth in this area for rubber suppliers looks bleak at best. Many observers are hoping the reduction in drilling for gas and oil has bottomed out. A big *if* here is that *if* the OPEC countries continue their internal squabbling, more oil

IISRP North American new rubber consumption forecast
(Thousand metric tons)

	1982	1985	1990
SBR - solid	1,081	1,164	1,250
SBR - latex	128	140	156
BR	406	444	498
IR	63	74	89
EPDM	149	179	221
CR	110	124	138
IIR	150	162	178
NBR	76	85	93
Other synthetics	58	68	85
Total synthetic	2,221	2,440	2,708
Natural rubber	748	832	925
Total new rubber	2,969	3,272	3,633
% synthetic	74.8	74.6	74.5

RMA U.S. tire market forecast
(Figures in millions of units)

	1982	1983	1984
Passenger tires			
Shipments			
Original Equipment	35.5	42.5	50.3
Replacement	129.0	130.0	131.0
Truck & bus tires			
Shipments			
Original Equipment	5.6	6.5	7.1
Replacement	27.9	29.7	31.2
Tractor-implement tires			
Shipments			
Original Equipment	1.1	1.4	1.7
Replacement	2.1	2.5	2.8

Tires and inner tubes: trends and projections 1972-83
(in millions of dollars except as noted)

Item	1972	1977	1979	1980	1981[1]	1982[1]	Compound annual rate of growth 1972-82	1983[1]	Percent change 1982-83[1]
Industry data									
Value of shipments[1]	5,747	8,971	9,542	8,803	9,000	9,000	—	—	—
Value of shipments (1972 $)[1]	5,747	5,784	5,065	4,053	4,000	3,940	−2.8	4,200	6.6
Total employment (000)	108	114	103	87	88	86	−1.9	90	4.7
Production workers (000)	83	88	81	66	66	65	−2.0	68	4.6
Average hourly earnings of production workers ($)	5.38	7.74	9.51	10.62	12.03	13.16	9.4	—	—
Capital expenditures	267	53	289	360	331	—	—	—	—
Product data									
Value of shipments[1]	4,898	8,128	8,959	8,373	8,650	8,550	—	—	—
Value of shipments (1972 $)[1]	4,898	5,240	4,756	3,855	3,800	3,750	2.1	4,000	6.6
Product price index (1972 = 100)	100.0	155.3	187.6	216.1	229.9	238.1	—	—	—
Quantity shipped (million tires)[1]	234	232	224	185	188	185	−1.9	197	6.5
Trade									
Value of exports	101	309	353	511	584	525	—	600	14.3
Value of imports	382	845	1,121	1,132	1,307	1,200	—	1,325	10.4
Export/shipments ratio	.021	.038	.039	.061	.068	.061	—	—	—
Import/new supply ratio[1]	.075	.098	.116	.126	.133	.123	—	—	—

[1]Estimated except for product price index, exports, and imports.
[2]Estimated.
[3]Forecast.
[4]Value of all products and services sold by industry SIC2822.
[5]Value of shipments of synthetic rubber products produced by all industries.
[6]New supply is the sum of product shipments plus imports.
[7]Passenger car, truck, and bus tires.
Source: Bureau of the Census and Bureau of Industrial Economics. Estimated and forecasts by the Bureau of Industrial Economics.

would be available at cheaper prices, thus reducing the need for further exploration in the U.S. One ray of hope found was that the number of active drilling rigs in the U.S. began reversing a downward trend during the last quarter of 1982 and showed signs of maintaining slow, modest growth. But that number, 2,550, was still almost 2,000 rigs lower than the figures at the end of 1981.

The construction industry is heavily tied into the general economy, and *if* the recession continues, *if* interest rates don't come down any more and *if* unemployment remains at record numbers, the outlook is not good.

But this area is one that probably shows the most promise of growth for the rubber manufacturers as they find new ways to replace standard construction materials with elastomeric products.

The biggest area of growth within the rubber industry is in rubber roofing, and a number of companies have entered the field in recent years. Goodyear is undergoing a third production expansion of its single-ply sheets. Firestone is constructing a multi-million dollar plant, devoting 250,000 square feet of production space to produce more than 400 million square feet of roofing annually. General Tire, GAF, Uniroyal and Carlisle, one of the first to offer single-ply roofing membranes, are some of the others that are in this expanding market.

"In 1974, single-ply membrane roofing accounted for 1% of the $4 billion market . . . by 1985 single-ply sheets will claim approximately 28% of the 7.25 billion market.

The increase in rubber roofing has been dramatic. In 1974, single-ply membrane roofing accounted for 1% of the $4 billion commercial-industrial roofing market. By 1980, it had gained 13% of the market and Goodyear estimates by 1985 single-ply sheets will claim approximately 28% of the $7.25 billion market.

Elastomers are expected to make inroads on other conventional construction materials as well. Adhesives, sealants and insulation are three areas that show growth potential as long as the general economy picks up and the construction industry reverses its downward trend.

Elastomers

Forecasting the performance of individual elastomers is sometimes tricky because many have several end use markets and oftentimes figures are incomplete or hard to come by as is the case with most of the specialty elastomers. The elastomers with heavy automotive usage, SBR, polybutadiene, butyl, polyisoprene and natural rubber are going through periods of slow growth and manufacturers are looking for other applications due to the maturing of the auto industry. But the problems in the auto industry hasn't stopped some elastomers from making gains in this area in a host of new applications such as air springs, fascia, fenders and adhesives. The other major markets are experiencing similar strong/weak areas within each market for selected elastomers.

Natural rubber

1982 was a hard year for natural rubber producers as they saw their com-

modity's prices continue a plunge that began 14 months earlier. In October of 1980, RSS 1 sold for $.80 a pound in New York and by the first week of December in 1982 the price for RSS 1 was $.41½ per pound.

The falling prices triggered two stock purchases by the newly formed International Rubber Organization which was formed to help stabilize prices. But even these purchases haven't been able to stop the downward movement of prices.

The low prices have had a negative effect on replanting in the producer countries as growers are turning to more profitable commodities. According to the Malaysian Rubber Bureau, rubber production declined 7.7% in 1982 in Malaysia, the world's leading producer. The MRB sees only a 1.4% increase in production for 1983. The other leading producers, Indonesia, Thailand and India, are expected to increase production slightly as well.

The U.S. continues to be the largest consumer for natural rubber, importing approximately 625,000 tons in 1982. The MRB forecasts the U.S. will increase consumption to 700,000 tons in 1983, but bases this figure on a turnaround in the economy in general and the automobile industry in particular. 75.8% of the natural rubber consumed in the U.S. goes into automobiles.

Synthetic rubber

More than 70% of the rubber consumed in the U.S. is synthetic. Of this, almost 60% goes to the manufacture of tires while another large percentage goes to the manufacture of other automotive parts such as hoses, belts, etc.

Shipments of synthetic rubber have dropped for the past three years. In 1979, shipments were around 6 billion pounds. Shipments declined to 5.1 billion pounds in 1980 and 1981 and consensus is that 1982 will be around the same figure. Prices have tripled since 1972 as the result of the petroleum price hikes worldwide.

The Commerce Dept. forecasts the synthetic rubber industry to grow at about a 6% rate in 1983. This will still be below the output levels of the mid-to-late 1970s. The long term prospects aren't as encouraging. Total use of synthetics in passenger cars is expected to decrease because of the smaller cars and smaller tires. But gains will be made by many synthetic rubbers, some at the expense of others which necessitates breaking down any forecast in synthetics into the individual elastomers.

SBR

Styrene Butadiene Rubbers have been and will continue to be the most popular of all synthetic rubbers. Almost one million metric tons of SBR was consumed in the U.S. last year. Passenger tires and tire products account for the majority (74.9%) of SBR consumption which means projections of performance by this elastomer are iffy and directly tied to the performance of the automotive industry. The IISRP sees SBR reversing a three year downward trend this year and projects consumption to reach 1.1 million tons by 1985 and 1.25 million tons by the end of the decade. These figures are still lower than the 1.4 million tons consumed in 1977.

Nitrile

Nitrile, a versatile elastomer, is used in many applications and is not tied as heavily to automotive as many of the other synthetics. It enjoyed a strong growing period when oilfield drilling activity was high because it had many oilfield applications, primarily as a blowout preventer. Approximately 76,000 metric tons were consumed in 1982, the highest level ever for this elastomer in North America. The IISRP sees consumption reaching 85,000 tons in 1985, 3.9% annual growth and 93,000 tons by 1990.

Polybutadiene

Polybutadiene is second to SBR in amount consumed and like SBR it is primarily used in tire and tire products with over 80% consumed in this

Hose and belting: trends and projections 1972-83
(in millions of dollars except as noted)

Item	1972	1977	1979	1980	1981[1]	1982[1]	Compound annual rate of growth 1972-82	1983[1]	Percent change 1982-83[1]
Industry data									
Value of shipments[1]	1,020	1,766	2,178	1,942	2,250	2,000	—	—	—
Value of shipments (1972 $)[1]	1,020	1,199	1,283	1,031	1,065	900	–1.1	990	10.0
Total employment (000)	32	34	39	32	33	30	–0.6	31	3.3
Production workers (000)	23	23	26	21	22	21	–0.8	22	4.8
Average hourly earnings of production workers ($)	4.41	6.07	7.58	9.12	10.24	11.33	9.9	—	—
Capital expenditures	32	55	138	119	—	—	—	—	—
Product data									
Value of shipments[1]	886	1,541	1,863	1,659	1,925	1,720	—	—	—
Value of shipments (1972 $)[1]	886	1,046	1,098	881	912	775	–1.2	850	9.7
Product price index (1972 = 100)	100.0	147.4	170.4	189.5	209.2	240.2	—	—	—

[1]Estimated except for product price index, exports, and imports.
[2]Estimated.
[3]Forecast.
[4]Value of all products and services sold by industry SIC2822.
[5]Value of shipments of synthetic rubber products produced by all industries.
Source: Bureau of the Census and Bureau of Industrial Economics. Estimates and forecasts by the Bureau of Industrial Economics.

RMA estimate of U.S. demand for molded, extruded and lathe cut mechanical rubber products (Figures presented are in millions and based on 1981 dollars)		
	1982	1983
Total molded goods	$1,286	$1,429
Total extruded goods	309	337
Total lathe cut goods	54	59
Total molded, extruded & lathe cut goods	$1,649	$1,825

area. However, unlike SBR, polybutadiene is finding newer applications which have enabled it to recapture some of the losses suffered during the past couple of years. Consumption in 1982 was expected to be around 406,000 tons up from the 388,000 of 1981 but still below the 450,000 tons recorded in 1979. The IISRP sees consumption levels growing 3.1% annually, reaching 444,000 tons by 1985 and almost 500,000 tons by the end of the decade.

Ethylene Propylene

Ethylene-propylene rubbers are one of the brightest areas in the synthetic rubber field. They have found applications in the roofing market, and because of its attractiveness in this area, strong growth is projected. EPRs are also used in wire and cable insulation and jacketing, hose, seals, gaskets and ever increasing new applications. 149,000 tons of EPRs were consumed in 1982, up from the 141,000 in 1981, but still below 1979's mark of 154,000. The IISRP sees consumption reaching 179,000 in 1985, a 6.7% annual growth. Growth will be around 4.7% through 1990 when consumption should reach 221,000 tons.

Butyl

Butyl is another elastomer that has heavy use in the automotive industry with approximately 72% of its total consumption used in tires and tire products. Its growth rate, however, is pegged a little higher than most of the general purpose elastomers because its performance characteristics are suited to a variety of applications that are now being used and discovered. Approximately 150,000 metric tons of butyl were consumed in North America in 1982. The IISRP forecasts a 2.6% annual growth up to 1985 when 162,000 tons will be consumed and growth through 1990 will be slower, almost 2% yearly, with consumption reaching 178,000 tons.

Polychloroprene

Polychloroprene, with its many uses and applications, has suffered the past couple of years along with the general economy. It is used in wire and cable, hose, belts, gaskets, seals, adhesives and roofing to name some of the major area. Consumption reached 110,000 metric tons in 1982, reversing a three-year downward move, but still less than the 130,000 tons consumed in 1978. The IISRP sees better times for the elastomer, predicting a 4.2% annual growth through 1985 when consumption should reach 124,000 tons. Growth will slow down toward the end of the decade with an annual rate of near 2.8% with consumption nearing 138,000 tons.

Polyisoprene

This elastomer is one pegged for better than average growth during the decade by the IISRP even with its heavy automotive use. Its the one synthetic that comes closest to natural rubber in its properties and is used in tires, motor mounts, bushings, rubber bands, hose and baby bottle nipples. 63,000 metric tons was consumed in 1982 with the IISRP predicting a 5.8% annual growth through 1985 up to 74,000 tons and over 4% growth the remainder of the decade when consumption is expected to reach almost 90,000 tons.

Specialty rubbers

This category includes some of the fastest growing elastomers of the North American synthetic rubber in-

Fabricated rubber products: trends and projections 1972-83
(in millions of dollars except as noted)

Item	1972	1977	1979	1980	1981[1]	1982[2]	Compound annual rate of growth 1972-82	1983[3]	Percent change 1982-83[3]
Industry data									
Value of shipments[1]	2,831	4,565	5,434	5,385	5,600	5,250	—	—	—
Value of shipments (1972 $)[1]	2,831	3,114	3,223	2,925	2,850	2,600	−0.8	2,800	7.7
Total employment (000)	99	99	106	95	95	89	−1.0	93	4.5
Production workers (000)	77	77	83	72	72	66	−1.3	70	6.1
Average hourly earnings of production workers ($)	3.64	5.19	6.02	6.55	7.13	7.75	7.8	—	—
Capital expenditures	89	135	195	161	—	—	—	—	—
Product data									
Value of shipments[1]	2,539	4,223	5,102	5,238	5,500	5,150	—	—	—
Value of shipments (1972 $)[1]	2,539	2,915	3,057	2,883	2,800	2,500	—	2,750	7.8
Product price index (1972 = 100)	100.0	145.5	168.0	183.5	203.9	202.0	—	—	—

[1]Estimated except for product price index, exports, and imports.
[2]Estimated.
[3]Forecast.
[4]Value of all products and services sold by industry SIC2822.
[5]Value of shipments of synthetic rubber products produced by all industries.
[6]New supply is the sum of product shipments plus imports.

Source: Bureau of the Census and Bureau of Industrial Economics. Estimated and forecasts by the Bureau of Industrial Economics.

Synthetic rubber: trends and projections 1972-83
(in millions of dollars except as noted)

Item	1972	1977	1979	1980	1981[1]	1982[1]	Compound annual rate of growth 1972-82	1983[1]	Percent change 1982-83[1]
Industry data									
Value of shipments[1]	1,089	1,863	2,634	2,660	3,110	3,200	—	—	—
Value of shipments (1972 $)[1]	1,089	1,132	1,270	1,054	1,075	1,065	–0.2	1,125	5.6
Total employment (000)	11.8	10.0	12.1	11.4	11.0	10.6	–1.0	11.0	3.8
Production workers (000)	8.2	7.1	8.2	7.4	7.1	6.7	–1.7	7.1	6.0
Average hourly earnings of production workers ($)	5.46	8.85	9.98	11.13	12.24	13.30	9.3	—	—
Capital expenditures	36	53	66	100	—	—	—	—	—
Product data									
Value of shipments[1]	1,289	2,354	3,228	3,248	3,800	3,900	—	—	—
Value of shipments (1972 $)[1]	1,289	1,430	1,556	1,288	1,315	1,300	0.1	1,375	5.8
Product price index (1972 = 100)	100.0	164.6	207.4	252.3	290.6	312.9	—	—	—
Quantity shipped (million pounds)	5,328	5,470	6,018	5,092	5,190	5,085	–0.4	5,400	6.2
Trade									
Value of exports	171	344	623	747	673	675	—	700	3.7
Value of imports	54	135	177	173	217	225	—	250	11.1
Export/shipments ratio	.132	.146	.193	.230	.171	.167	—	—	—
Import/new supply ratio[1]	.040	.054	.052	.051	.052	.051	—	—	—

[1]Estimated except for product price index, exports, and imports.
[2]Estimated.
[3]Forecast.
[4]Value of all products and services sold by industry SIC2822.
[5]Value of shipments of synthetic rubber products produced by all industries.
[6]New supply is the sum of product shipments plus imports.
Source: Bureau of the Census and Bureau of Industrial Economics. Estimated and forecasts by the Bureau of Industrial Economics.

dustry. But how fast they are growing or where they are headed is hard to predict because even the IISRP has trouble defining just what is a special purpose elastomer and therefore keeping statistics is almost impossible. The IISRP has recently set up a structure so it can monitor these elastomers more closely.

The government lumps many of the aforementioned elastomers into its specialty elastomers designation. The government divides synthetic rubber into general purpose and specialty areas but the only rubbers considered general purpose are the SBRs and polybutadienes. All others come under the specialty heading.

Using the governments approach, specialty elastomers have more than doubled their share of the market since 1960 when these rubbers accounted for 19% of the synthetic rubber produced in the U.S. This 274,000 metric tons has risen to 875,000 metric tons by 1981, accounting for more than 39% of the total synthetic output.

The IISRP doesn't use quite as large a base for its specialty rubbers, including acrylics, polyester/polyether, epichlorohydrin, butadienes, ethylenes, silicones and urethanes among this category. Some of these are thermoplastics — copolymers which are capable of being repeatedly softened by heat and then hardened by cooling and displaying elastomeric properties similar to rubber without the need for vulcanization.

Thermoplastics are the fastest growing segment in the rubber industry. From 1977 to 1980 when total rubber consumed dropped 29%, TPEs increased 32%. Their growth, however, many times is at the expense of another elastomer it replaces in an application. Most estimates of the growth for these elastomers has been pegged in the 8-10% yearly range through the mid 1980s. Some individual TPEs are projected for higher growth. Although they don't represent that large a segment of the industry, some 330 million pounds sold in 1981, their projected growth is 540 million pounds sold in 1985 according to Shell Chemical.

U.S. synthetic rubber production
(1,000 metric tons)

Year	General Purpose Quantity	General Purpose Percent	Specialty Quantity	Specialty Percent
1960	1,185	81	274	19
1965	1,438	78	404	22
1970	1,636	73	596	27
1975	1,493	75	497	25
1980	1,461	65	780	35
1981	1,375	61	875	39

Source: Bureau of the Census.

Conclusion

It's not the same old future for the rubber industry as it appeared a few short years ago. Nothing appears clear-cut. Many of the major markets are changing and the elastomers are changing right along with them. It's a challenge to the rubber industry to keep finding new applications for the old standby elastomers and create markets for new elastomers.

1984, 1985 look good

Rubber industry growth pegged at 2%

by Vladimir Simunek

The 1983 forecast for the U.S. economy shows a turn for the better starting in the second quarter, but the growth will not be too strong. This Institute expects that the economy will advance by 2.2% in 1983. That is progress when compared with the 1.7% decline experienced in 1982. However, the year's growth will still be below the average 6% increase in previous recoveries. The unemployment rate will remain uncomfortably high and will abate gradually at the most, and not earlier than in the second half of the year. For 1983 KEDI projects a 9.7% unemployment rate, approximately the same level as in 1982.

On the bright side, KEDI expects that the rate of price increases for consumer goods will be within tolerable levels; an average 6.8% rise is projected. The interest rates are expected to stabilize and no significant ups or downs will take place throughout the year. On the average, the prime rate is projected around 11% for most of 1983 with some increases toward the end of the year.

In 1983 some industries will perform strongly, mainly defense, oil, energy exploration, aerospace, food and kindred products, wholesale and retail trade, and banking. Improvements are expected in construction, housing, paper and paper products, plastics, textile, coal mining, printing and publishing, lumber, chemicals, stone, glass, and clay industries. Automobile, steel, nonferrous metals, metal mining, and machinery industries will not be out of the woods yet.

The rubber industry will experience a mild growth. KEDI's projection shows an approximate 2% overall increase for 1983. This is not too spectacular since a 2% growth is approximately one half of the projected long-term annual growth rate for this industry. The tire segment will expand by around 2.5%. A significant increase is expected in the demand

(continued on page 55)

Dr. Vladimir Simunek is professor of economics at Kent State University, and president of the Kent Economic and Development Institute (KEDI). KEDI is ranked among the best of U.S. forecasters and its forecasts are quoted in leading professional publications. The Kent Economic Forecasting System has been evaluated as one of the two most advanced U.S. systems based on its theory and design.

TABLE 1 – RUBBER FORECAST

No.	Indicator	Unit	Year 1982*	Year 1983 1	2	3	4	Year 1983
01	Tires	1967 = 100	144.7	132.4	144.5	160.7	157.2	148.7
02	Rubber Products excl. Tires	1967 = 100	126.5	126.3	130.4	132.7	134.1	130.9
03	Synthetic Rubber (01-03 are indicators of the U.S. Index of Industrial Production)	1967 = 100	83.1	74.8	81.4	88.7	96.2	85.3
04	Pneumatic Casings, Automotive, Production	mil. units	187.3	46.3	47.9	50.3	48.1	192.6
05	Natural Rubber, Consumption	thous. metric tons	624.1	154.8	158.9	162.4	163.6	639.7
06	Producer Prices: Rubber and Rubber Products	1967 = 100	270.9	281.4	284.3	292.3	299.8	289.5
07	Consumer Prices: Tires	1967 = 100	192.1	195.1	197.3	200.2	207.8	200.1

*Historical data
01-03 data are seasonally adjusted at annual rates

TABLE 2 – GENERAL ECONOMY FORECAST

No.	Indicator	Unit	Year 1982*	Year 1983 1	2	3	4	Year 1983
08	Gross National Product	bil. 1972$	1476.9	1484.3	1498.6	1516.8	1535.7	1508.9
09	Gross National Product	bil. $	3064.7	3185.3	3271.4	3347.6	3450.7	3313.7
10	GNP Implicit Price Deflator	1967 = 100	207.5	214.6	218.3	220.7	224.7	219.6
11	Index of Industrial Production	1967 = 100	139.1	139.6	143.5	146.7	150.1	145.1
12	Consumer Price Index	1967 = 100	289.5	301.3	305.8	312.8	317.9	309.5
13	Unemployment Rate	%	9.7	10.3	9.9	9.4	9.2	9.7
14	Private Housing Starts	mil. units	1.024	1.089	1..356	1.411	1.384	1.310
15	Car Sales	mil. units	7.8	7.9	8.0	7.9	8.1	8.0
16	Light Truck Sales	tho. units	.9	497.2	496.6	498.7	512.7	2005.2
17	Prime Rate	%	14.9	11.4	11.9	12.0	12.5	11.9

08-15, 17 are seasonally adjusted at annual rates
*Historical data

storage of field latex and production of LA-TZ latex concentrate.

Also covered are properties of LA-TZ latex, latex compounding and vulcanization, applications of LA-TZ latex, and toxicity. *(MRB)*

Circle 135 on card

U.S. Molding is your key to increase profits. Illustrated; 6 pp. Covers company's services, including: screw-injection retrofitting compression, transfer or ram injection molding presses; development and building of accessories and attachments for a specific task during rubber molding production; automation of existing molding presses; installation of new or used presses; rebuilding of replacement parts for molding presses; service on rubber molding presses. *(U.S. Molding)*

Circle 136 on card

"Castethane" P Prepolymer Systems for Polyurethane Elastomers. Form No. CE-58. 4 pp. This product selector guide describes the Castethane P systems, including eight polyether systems, two polyesters, and four polycaprolactones, and also gives their typical physical properties and safety precautions for "CPR" — "Castethanes" "Rimthanes," "Isonates," and Spray Emulsions. *(Upjohn)*

Circle 137 on card

"UCAR" Latexes for Pressure Sensitive Adhesives . . . Water-Borne Emulsions of Acrylic Polymers Featuring a Wide Range of Adhesive Properties. Folder F-48333. 4 pp. In chart form appear brief descriptions including applications of the six latexes and their typical physical and adhesive properties. *(Union Carbide)*

Circle 138 on card

Introducing Model 1000 . . . Materials testing at a very affordable price. Bulletin IC-3-150. Illustrated; 8 pp. Covers every phase of this table-top universal tester designed especially for a broad range of repetitive testing requirements. *(Instron)*

Circle 139 on card

Continental Carbon literature:

"Continex" Carbon Black Compendium. First Edition. 2 pp. In an interpretation of data on the charts and discussion of limitations of carbon black test properties (including only those properties characterizing compounding, processing, and storage of black) covered are particle size, iodine number, nitrogen surface area, DBP, 24M4 DBP, tint, pour density, tensile strength (ultimate), 300% modulus.

Transit Times. Volumes No. 1 and No. 2; each illustrated and 4 pp.

New bulk facility at Barberton proves . . . **Logistical Bonanza for Carbon Black Users in Ohio.** Deals with location of the bulk storage units and advantages therefrom to carbon black users, and advantages of semi-bulk system vs. bagged black.

Continental's Carbon Black Plant at Ponca City Creates Huge Freight Saving for Rubber Industry. Advantages of this site are considered, and a map shows the savings in freight and time with Ponca City contrasted with the nearest alternative of supply. Freight rate increases from 1977 on are also included. *(Continental Carbon)*

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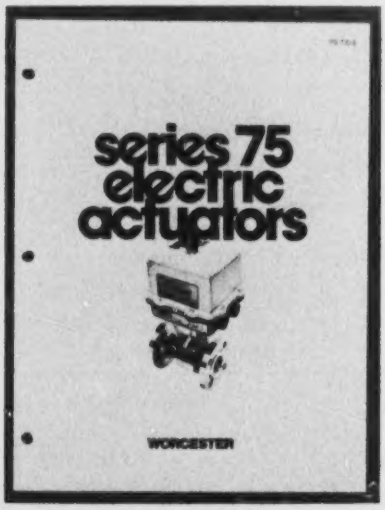

Series 75 electric actuators. Bulletin PB 730-9. Illustrated; 12 pp. Covers an expanded line of electric actuators for throttling and on/off valve automation, their design features, specification and engineering data, advantages, and optional equipment. *(Worcester Controls)*

Circle 141 on card

"Santoprene" Thermoplastic Rubber. Illustrated; 12 pp. Covers descriptions of these rubbers, grades available, applications, performance characteristics, physical properties, rheology, storage and handling, processing. *(Monsanto)*

Circle 142 on card

Miner Enterprises bulletins:

Rubber vs "TecsPak" Comparative Static Test. Illustrated; one p. Comparative static testing analysis of a TecsPak compression spring and a typical natural rubber design.

"TecsPak" High-Load Compression Springs. Illustrated; 4 pp. Discusses this proprietary elastomer based on "Hytrel," covering advantages, applications, endurance, energy absorption, temperature characteristics, design development and manufacturing service for the springs, evaluation, prototyping, and testing. *(Miner)*

Circle 143 on card

"United" Carbon Black Product Guide. Bulletin No. 1497. 4 pp. Tabulates ASTM stress/strain and typical physico-chemical properties for both more reinforcing and softer, less reinforcing grades and also presents interpretation of physico-chemical properties. *(Ashland Chemical)*

Circle 144 on card

The Vulcanizer by Vulcan. Illustrated; 2 pp. Describes this two-stage inline screw rubber injection conversion unit for upgrading compression and transfer molding presses along with plunger-type injection presses. *(Vulcan)*

Circle 145 on card

KEDI forecast

(continued from page 20)

for light truck tires, and aircraft and bus tires. A less significant gain is projected for passenger car tires and farm tractor tires.

Forecast for the non-tire segment shows gains in the demand for hoses, thermoset resins, specialty rubber, molded goods, shoe products, floor and wall coverings, drug and medical sundries, sealants, caulking and compounds. Later in the year, gains in the demand for flat belts are projected.

The price outlook for the rubber industry shows moderate price increases by the majority of products but below the general inflation rate. In particular, prices of passenger car tires will rise on the average by 4.2%, and truck tires by 5.4%. Above average price increases are expected in the non-tire segment, especially specialty rubber products.

In the long term projection of this Institute, the rubber industry will expand more significantly in 1984 than 1983 and will continue growing in 1985 and the following years. The 4% growth rate will be achieved in 1984.

A long term perspective on synthetic vs. natural rubber pricing and growth

by Clayton F. Ruebensaal,
Uniroval, Inc., Middlebury, CT

Introduction

Long range price forecasting of commodity futures has occasioned considerable attention in the past and particularly so as more and more future markets have been set up.

In addition, many sophisticated econometric studies have been conducted, particularly on rubber pricing by world organizations such as the United Nations, The World Bank and others. A review of some of these studies shows them incorporating so many variables in their formulas that the inexactness introduced often magnifies, rather than reduces, the error in predicting future price and consumption levels.

Admittedly then, predictions of rubber price and growth have been "off mark" to various degrees in past studies. However, there has never been a period in modern history when econometricians and economic forecasting services have been as far off-base in general as they have been in the chaotic period of 1980-1982, just one example of many being the almost uniformly widely errant estimates of some 40 economists regarding a forecast for the U.S.A.'s Gross National Product. An average of their forecasts of the U.S.A.'s Real Gross National Product for the first quarter of 1981 — *made at the start of 1981* — was estimated to be a *loss* of 1.1%. The actual GNP recorded, just three months later, turned out to be an 8.6% *gain.*

We, as industrial forecasters, apologize for some errors by citing how econometric estimates we are obliged to use are often themselves in error, just as the econometricians, in turn, attribute their "goofs" to faulty or late government data.

Forecasting and its objectives

What then is the value of forecasts if they frequently prove not to hit the mark? It would appear that the real value of forecasting derives from studying and understanding the various technical and financial assumptions upon which the forecast is based. Then, as one or more of the technical, economic or financial considerations start to deviate from the assumptions, managers can be readily aware of the broad significance, or even specific effects, of such changes upon the total forecast. This permits faster response times to correct critical situations than would have been possible had such an overview not been prepared.

Providing a clearer long-range perspective, then, will be the objective of this article. Specifically, the objective is to uncover some of the major, longer-term considerations likely to affect any price relationship which might exist between synthetic rubber and Hevea, rather than to attempt to definitively peg their respective future price levels.

The principal response of natural rubber pricing appears to lie in its sensitivity to world volume demand levels. On the other hand, synthetic rubber's principal price moves — although also responsive to demand — are due to its sensitivity to raw material costs. These sensitivities are established for two five-year periods — 1973 to 1978 in Figure 1 and 1979 to 1982 in Figure 2. To more clearly display these relationships, the price movements of natural rubber (No. 1 RSS Spot NY*) and synthetic rubber (general purpose, non-oil extended SBR 1500*) are traced for the past decade vs. changing World Total Rubber Consumption levels in the same period.

In addition, crude oil price (shown as import price into the U.S.A.) is plotted in Figure 1 to show it skyrocketing in the 1973-74 period and again in the 1979-80 period in Figure 2. From a $2-4/bbl. range in the early 1970s to $13/bb. in early 1974 — an increase of approximately 225% was experienced. Crude oil then escalated very slowly from the $13/bbl. level in early 1974 to only about $15/bbl. in late 1978. As indicated in Figure 2, imported crude oil prices took off again, skyrocketing to a $35-39/bbl.** level in 1980-81 — an increase of some 150%. The recent worldwide oil glut has dropped this figure to somewhere in the present range of $32-33/bbl. and could establish an average price of about $33/bbl. for 1983.

Natural rubber — price sensitivity to volume

World rubber consumption had continued to increase every year for over 30 years, i.e. from the 1940s to 1973, possibly a record for uninterrupted growth for any commodity. This is shown by the consumption trend line and the resulting increase in natural rubber price from the low 20s to a peak of 53¢/lb. by January 1974. This price level was reached just a few months after world rubber consumption had attained a (to that time) monthly high consumption level of 945,000 metric tons. However, the years 1974 and 1975 registered the first declining consumption levels, as shown by the trend line, with a monthly low in that period some 21% below the 1973 high. Consequently, natural rubber price was almost halved, from its early month peak of 53¢ to 27¢/lb. by year end 1974. This was below the price of SBR 1500. It stayed below SBR 1500 throughout most of 1975 and did not climb again until 1976, when unilateral Malaysian buying aided in the recovery of natural rubber price.

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*A more realistic price comparison would be the relationship of the lower-priced No. 3's and 4's or SMR-20 natural rubbers vs. a blend of about 32% SBR-1500 and 68% of the lower priced, oil-extended, 1700-type SBR's (which are about 78% of the cost of 1500). These rubber types constitute the larger volume rubber grades used in tires. However, these specific price relationships are more difficult to establish, particularly since the premium for No. 1 RSS over the lower grades has varied between 8 and 22% during the past couple of years and further, that in periods of very low demand that the SBR's may be significantly discounted from the "list prices."

**In the U.S.A. "Composite Oil Price," i.e., the average of Domestic and Imported Oil, (not plotted) was lower than "Imported Oil Price" by some 20% ± 5%, because of the controlled domestic oil price. This differential disappeared by the second quarter of 1981 after controls on domestic oil prices had been removed.

Figure 1 — Total world new rubber consumption MT/per month 1973-1977

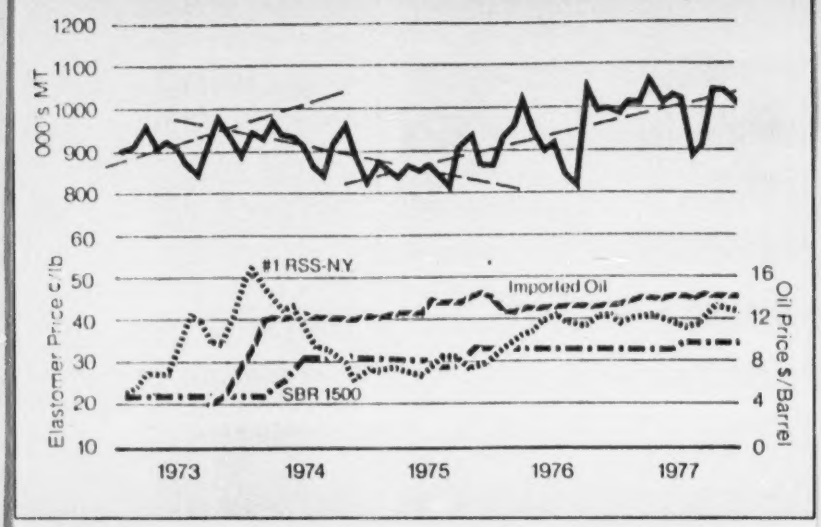
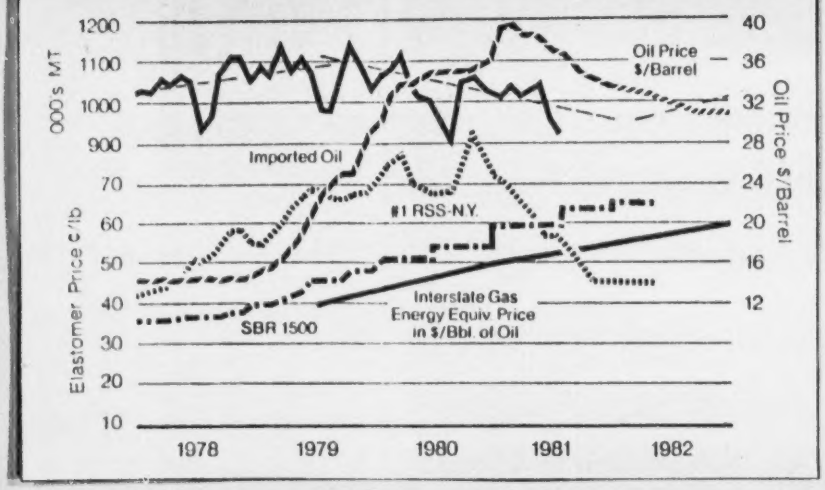


Figure 2 — Total world new rubber consumption MT/per month 1978-1982



World consumption of total rubber started to rise again in 1975 and rose every year in the four-year period through 1979. In 1975, as shown by the trend line, natural rubber price also initiated a slow climb (broken only by occasional monthly declines) until it reached a peak just above 80¢/lb. in late 1980. However, 1980 turned out to be the start of another period of decline in world rubber consumption. Natural rubber price again showed a similar volume sensitivity to the pattern it had demonstrated in 1974-75 and, once more, started to drop. This price drop continued through 1981, hitting a low in the range of 46¢ in late 1981 and then continued to decline to reach an average of about 44¢/lb. for the year of 1982 — the lowest yearly average since 1977. During this period, world rubber consumption declined from a high month of 1,100,000 metric tons in March 1980 to 915,000 metric tons in August 1981 — a drop of 17%. Despite a continued reduction in world consumption, the start of inventory purchases by the International Natural Rubber Organization in late 1981 apparently resulted in stabilizing natural's price in the 46¢/lb. range during 1981 but could not prevent the further price deterioration in 1982.

It would be anticipated that natural rubber's price would start a slow climb again in 1983 for actually three compelling reasons: First, to recover rapidly escalating costs which are detailed in subsequent paragraphs. Second, as the U.S.A. economy starts to improve in the first half of 1983 and as other major world economics start to recover later in 1983 and 1984, a higher demand level will be created. Finally, a longer range improvement in natural rubber pricing is likely to result, not only for the first two mentioned factors, but also from a deterioration of supply. This is for two reasons: rubber cultivation has been supplanted to some extent by higher profitability crops such as palm oil and cocoa, and low-yield rubber acreage is being withdrawn from production to permit replanting of higher-yielding trees.

With regard to the effect of escalation on natural's price, the variable elements of natural rubber production costs, specifically labor, energy, and fertilizer, which go into upkeep cultivation, tapping and collection costs, have been climbing — somewhere in the range of 15%/year since 1972. However, increased yields, being realized on higher-yielding estates, bring the total cost increases, on a per-pound basis, below 10% per year. Production costs of natural rubber do vary, though, over a wide range, dependent upon the size and yield level of the estate, and with the productivity level (age) of the processing equipment.

Despite this near-term outlook for increased natural rubber price, the longer-range competitive relationship of natural rubber price to general purpose SBR price has been seen by many analysts as shifting in favor of Hevea, as world consumption levels begin to grow again.

Synthetic rubber — price sensitivity to petroleum

In contrast to the importance of consumption levels on natural rubber price, synthetic rubber prices during the past decade, as evidenced in Figures 1 and 2, have continued to move up with increasing oil prices.

As stated earlier, Figure 1 shows crude oil moving out of the early 1970s $2-3+/bbl. range to $13/bbl. by mid year of 1974 — a 225% increase. SBR, which had ridden at about 23¢/lb. from the beginning of the 1970s reacted to that crude price climb, but increased only 40% to 32¢/lb. in the same period.

After synthetic's 9¢ gain during that short period, it then rose 20% from 1974 through 1978, increasing from about 32¢ to 38¢. This roughly

paralleled the crude oil price increase from $13/bbl. to $15/bbl. in the same period.

However, crude oil skyrocketed again to a $35-$39/bbl. level in 1980-81 — an increase of some 150%. SBR tracked that "step up" but to a smaller degree, by rising from 38¢/lb. to its high of a list price of 66¢/lb. by early 1982 — an increase of 73%.

These data certainly support the thesis that synthetic rubber production costs have continued to escalate with oil prices. Although this was generally true, it may be a bit simplistic for our future view in light of other global changes which can be foreseen.

For example, as little as one year ago, econometric and petroleum forecasting services had pegged U.S.A. 1982 crude oil acquisition cost at $45-$50/bbl. This forecast was 45% above the lower figure of $32-$33/bbl. which now appears to be a more likely average for 1982. Continued escalation will now probably only carry it up to $36/bbl. by 1984.

This more modest escalation in crude is known to have been due to conservation measures and the low level of world business activity. Synthetic rubber pricing is, unfortunately, not foreseen as being able to parallel this reduced escalation rate for crude; either short term or long term, because of other rising cost factors. Most notable of these being natural gas prices which are already escalating at about a 15%/yr rate, despite the fact that full U.S.A. controls have not been removed.

The chemical industry, as a whole, utilizes about 10% of U.S. natural gas consumption. The synthetic rubber industry, an even higher percentage (although accurate statistics are not available). This is due to the previously important, and now increasing, dependency upon natural gas liquids for feedstocks and natural gas energy, e.g., for driers. The nation's expanding dependency upon natural gas is illustrated by the fact that in recessionary 1981, natural gas consumption fell off only 1% compared with a 6% decline in oil consumption.

Three near-term factors point to renewed higher synthetic rubber pricing. First, the considerable reliance of synthetic rubber upon natural gas, and secondly, the fact that deregulation of natural gas is not forecast to be accelerated from the originally scheduled Natural Gas Policy Act date of 1985. The third, but smaller, factor affecting future price rises will be the continued modest recovery in crude oil prices.

Figure 3 — Forecasted escalation of crude oil vs. natural gas

	1980	1981	1982	1983	1984
Average Refiner Cost Crude Oil $/Bbl.	$28	$35	$33	$33	$36
% Price Change	—	25%	(6%)	0	9%
Interstate Gas Prices @ Equivalent Crude Oil Energy Price $/Bbl.	$15	$17	$19	$22*	$25-30*
		13%	12%	16%	15-35%

** This rise will be dependent upon how much and how soon price decontrol legislation is enacted to supersede the Natural Gas Policy Act Decontrol set for 1985. Conceivably, Natural Gas prices could equate themselves with Crude Oil prices some time late in the second half of the 1980s.*

Figure 3 shows the magnitude of the much more rapidly escalating prices of these changes which are now forecast for natural gas, (even without decontrol), vs. the change forecast for crude oil.

Of equal importance, but of a longer-term significance, is the new pattern developing in world petrochemicals. Moves have already been initiated in many oil and gas-rich countries to up-grade their crude petroleum products into commodity chemicals. These products, such as ethylene, propylene, butane, butadiene and styrene are all planned to be produced in high productivity, world-scale plants. All the large-volume synthetic rubber feedstock materials should have potential production costs from these petroleum-rich countries well below the costs from existing plants in developed nations.

Pages of listings of such plants; those just coming on stream, those planned for completion in a year or two, or those envisaged by the mid-1980s, could be shown. However, just one figure — the planned growth of all OPEC ethylene projects from a level of 0.42 million metric tons in 1980 to 4 million metric tons* by 1985, should suffice. The ethylene output, with its propylene and butadiene byproducts and styrene coproduct, will be largely available for world markets. Available principally for export — but some as well for upstream commodity synthetic rubber plants now being planned.

With this formidable drive by hydrocarbon-rich countries to upgrade their vast petroleum reserves in modern, low operating cost, world-scale plants, the future for the older and some smaller-scale facilities in the developed countries appears dim. If the synthetic rubber game is continued to be played by the developed countries, it must be a high value-added game, rather than a commodities game. This means finding some new, upgraded uses for the commodity rubbers, but more importantly, converting to or at least expanding to encompass the more sophisticated, high, value-added, special-purpose elastomers.

This consideration is one of the compelling reasons behind a proposal made to the International Institute of Synthetic Rubber Producers' (IISRP) Statistical Committee viz. that they initiate estimating all specialty elastomer** *capacities* which exist, and which are planned, around the world. Such statistics cannot now be singled out by company or even by specific type, which might disclose individual plant capacities. The fear of this has made the Statistical Committee's efforts to compile *production* statistics on the specialties most difficult for the past six or more years. No objection could conceivably be raised to the preparation of capacity estimates for groups of polymers. Such totals would have the salutory effect of providing a starting point which could be improved upon every year, to develop a much-needed perspective of the growth rate of these special-purpose polymers. This is so vital for our industry and for the IISRP to gain a perspective of this fast-growing (10-15% per year) sector of the syn-

(continued on page 27)

*OPEC Annual Report citing planned capacities as of July 1981.

**i.e., including all special-purpose thermoplastic and vulcanizable specialty rubbers, but excluding foamed or liquid polyurethanes, plasticized PVC, and all the large volume specialty synthetics such as the EPDM's, chloroprenes, butyls and nitriles. Approximately half of these specialty rubber capacities are now listed in the recently published *Synthetic Rubber — 1982* by the IISRP, Houston, Texas.

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cooling down and heating up cycle. This energy conservation will extend into the rubber production area when facilities are specifically designed to produce particulate elastomers.

These continuous processing systems for particulate rubber compounds can provide for more effective mixing of certain "difficult to mix" rubber compounds. The prerequisite for these compound processing machines is a premixing section in which all of the ingredients for the compound, including the particulated elastomer are preblended. Certain preblending equipment already exists to accomplish the task properly, and new equipment is being developed and brought on to the market that provide improved preblending capability. These are not high powered machines, consequently can fit within the total energy envelope in a positive sense. Basically, the compound mixing procedure is divided in that the preblending operation accomplishes all of the extensive, or distributed type mixing necessary. Depending on the relative nature of the product sizes of the different ingredients, this preblending can put the compound on the threshold of dispersive type mixing. The mixer/compound processor machine, where the mixing section of some of these unique machines can be independently controlled and, therefore, impart only the degree of intensive shear mixing necessary to accomplish the final level of dispersion. There is no need for over mixing in order to be sure that both extensive and intensive mixing have been equally satisfied. With the properly available elastomers, such compound processing systems can mix and extrude the white wall section for tires or the preform for compression molding or final shapes ready for curing, in one step. Some of this is being done today. The process cost savings would appear to be obvious to everyone in the rubber industry.

The same philosophy of saving energy, while at the same time improving rubber compound processing, will extend throughout the rubber industry with respect to machinery. Steps will be combined so that operations/performance will be improved. Microprocessors with rubber compound evaluations/feedback loops combined with processing machinery capable of making predictable changes during processing will produce such combinations as: tread section extruders that will compensate for minor infeed variations in infeed compound viscosity to produce more uniform extruder sections; rubber calenders with roll and bank control assuring uniformity of rubber compound feed through the roll to virtually make redundant sophisticated "after the fact" gauging/control systems; robots that build tires; and, mold press/curing systems that supply heating energy in direct proportion to the relationship between thermal inertia and thermal momentum. Many of these advancements will be accomplished by modifying/modernizing existing equipment and combining it with new control systems. These are measures that should help the industry (which has traditionally had obsolete and capital intensive equipment as its anchor to technical progress).

In reviewing the projections for rubber processing machinery in the 1980s, it is not terribly difficult to predict the impact on machinery for the rubber industry in the 1990s. This could comprise complete one-step rubber compound processing from raw material to finished product, even for tires. This means there will be blended compounds processed through combination machines mixing and preforming and applying to skeleton tire carcasses in rotary mold/curing systems, shortened curing cycles because of all formed sections being applied in elevated temperature conditions, the lowest economic production run directly related to one circuit of the rotary system, mold changes within one rotation of the system and compound changes accomplished in the same time. Tires ordered yesterday, made today, and shipped to the customer tomorrow. Repeated handling, intermediate storage and raw material and finished goods inventory will be reduced to an absolute minimum — all enough to make the financial nabobs of the rubber industry demanding that this all come to pass sooner.

Impossible? Not at all. It is only a matter of time before such comes to pass. What will come to pass, and much sooner, is that the rubber industry will go from thinking about rubber processing to elastomer processing, and then to polymer processing, taking advantage of the entire spectrum of polymer properties and capabilities and processing "know how."

The compound processing industry will then be of age and getting ready for the 21st century. The rubber machinery industry will not only be ready, but it is quite possible that it will lead the way. RW

A long term perspective on synthetic vs. natural rubber pricing and growth

(continued from page 23)

thetic rubber industry vs. the slowing or, in some cases, actually declining growth rate of the commodity rubbers.

As just one example of the importance of knowing more about these special purpose elastomers, we might attempt a comparison of their present market value vs. the sales volume of natural rubber.

It is estimated that natural rubber was coming into the United States at a seasonally adjusted annual rate of about 575,000 metric tons per year for 1982 or at a 1.25 billion pound consumption level. At an average price of say 40¢/lb., considering the high proportion of lower grades, which are used, this is a dollar volume of about $500,000,000.

Conversely, we have a fairly good estimate of thermoplastic rubber consumption in the U.S.A. as being in the range of 350,000,000 lbs. and there are at least another 150,000,000 lbs. of vulcanizable specialty rubbers.* At a weighted average price of about $1.50 per pound for these 500 million lbs.,** the specialties have a total sales value of some $750,000,000. Even if this total were more conservatively estimated, it would still be appreciably in excess of the sales value of natural rubber.

Endless papers have been written, numerous econometric models developed and successive meetings held in past years to evaluate the future price relationship and market shares of natural rubber vs. "synthetic rubber." In the light of the significant dollar mag-

*The styrenics, gum type urethanes, olefinics, copolyesters and ethylene copolymers such as ethylene-vinyl acetate and ethyl acrylate copolymers.

**The acrylics, epichlorhydrins, chlorinated and chlorsulfonated polyethylenes, flourinated and sulfide rubbers and the silicones.

nitude of these newer specialty elastomers, which we have shown, it would appear that we must now set about to finally develop more meaningful statistics on the high value-added, rapidly growing, specialty synthetic elastomer sector of our industry. This should permit a method for improving the less than all inclusive comparisons of the past. It might, in fact accomplish the ultimate objective of determining a truly more realistic, future relationship of the natural rubber industry vs. the *total* synthetic rubber industry. The *total* synthetic rubber industry, which by definition, should include all the newer specialty synthetics as well as just the large volume commodity rubbers to which we have essentially restricted our statistics in the past.

Summary

In summary, all these factors afford a conclusion that natural rubber pricing will once more regain its previous highs as growth of world rubber consumption in the late 1980s exceeds the levels it attained in the second half of the 1970s. The second most important factor contributing to this prediction will be the tightened supply-demand balance of Hevea due to its insufficient production capacity during periods of peak world demand.

"We should see perpetuating escalation of synthetic rubber prices, as crude oil and other production costs, continue their modest escalation trends."

On the synthetic side, we should see perpetuating escalation of synthetic rubber prices, as crude oil and other production costs, such as labor, continue their modest escalation trends. This should prove particularly true in the U.S.A. with spiraling natural gas costs resulting from increasing decontrol.

It also appears that world centers for the production of low cost petroleum-based feedstocks, and also to some extent, facilities for the manufacture of large volume, commodity rubbers and their monomers, will shift from developed, to petroleum-rich, developing nations.

Competitiveness in synthetic rubber for the developed nations must transfer then to the newer, faster growing, high value-added specialty elastomers.

We must, therefore, come to better understand the full growth potential of this vital specialty segment of our industry, the market value of which appears to have already surpassed that of natural rubber in the U.S.A. And finally, to understand the importance of the specialty elastomer segment, to the developed countries' rubber industry, as a prime opportunity for renewed growth and profitability.

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Short fiber reinforcement of elastomers

...for fair trade

...to application ...

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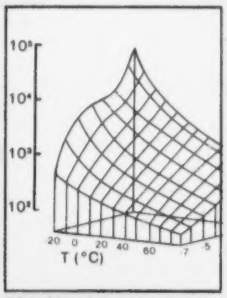
VOLUME 187/NUMBER 5/FEBRUARY 1983



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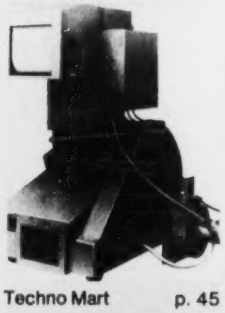

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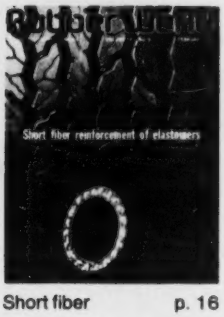

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ABP

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Business Briefs

Acquisitions, expansions

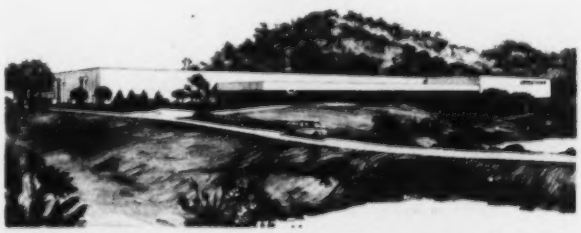
Bridgestone Tire Co. finalized its acquisition of **Firestone's** LaVergne, TN radial truck tire plant for a price of $52 million. The purchase agreement includes a provision under which the plant will produce tires under the Firestone label for a specified period of time while retooling and other improvements are under way prior to the start of production of Bridgestone-label tires. The first Bridgestone tires are expected to be produced in early 1984.

Arco Chemical is now selling high purity isobutylene directly to the chemical processing industry. The product has been produced by Arco at Bayport, TX, since 1969 and the company has an annual capacity of 350 million pounds.

Itran Corp., designers and manufacturers of custom molded rubber components has established a regional sales engineering office in Houston, TX.

Engelhard Corp. purchased the Torvex ceramic honeycomb and catalyst support technology and business, including systems technology, trademark and patents from **Du Pont**. Torvex operations will be continued by the systems department of Engelhard Industries Division in Union, NJ.

M&T Chemicals approved plans to construct a thio-organic facility to manufacture Thioglycolic Acid in the U.S. to be located at the company's Mobile, AL complex. The multimillion dollar addition will have a capacity of 4,000 metric tons per year when it goes on stream in the fourth quarter of 1984.



ARTIST'S RENDITION of new Goodyear wire cord plant.

Goodyear will invest more than $50 million to build a steel wire cord plant in Asheboro, NC. More than 350 jobs will be created in the 200,000 sq. ft. facility when full production commences sometime early next year.

Rheometrics, Inc., manufacturer of advanced materials testing equipment, consolidated its two manufacturing plants into one 30,000 sq. ft. facility in Piscataway, NJ.

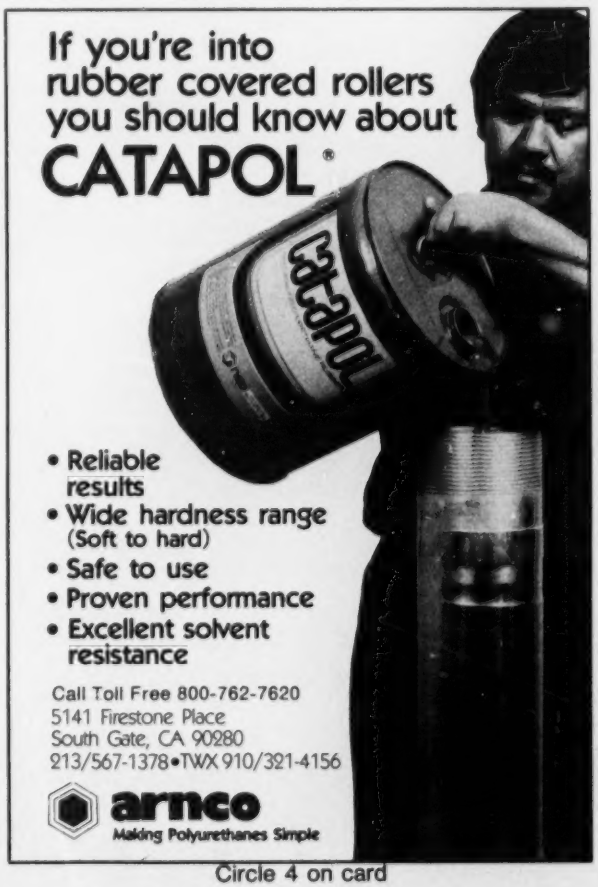
Cook Chemical Co., Akron, OH acquired the **C.D. Droman Co.,** a manufacturers representative to the plastics industry. Major principles include Colorite Div. of Dart Industries, American NuColor and Polyblends, Inc.

Truform Rubber Products, manufacturer of custom molded rubber and rubber bonded to metal parts, moved into its new 18,000 sq. ft. manufacturing plant in Hudson, OH.

Carlisle Corp. has agreed in principle to acquire **Numeridex Inc.,** Wheeling, IL, a privately held company that provides products and services to users of numer-

RMA monthly tire shipments & production report through October 1982
(Figures in thousands of units)

Passenger Tires	YTD 1982	YTD 1981*	% Change
Shipments			
Original Equipment	28,472	31,548	−9.75
Radial	23,805	26,249	−9.31
Replacement	112,033	107,860	+3.87
Radial	73,084	64,941	+12.54
Export	2,367	3,433	−31.05
Radial	1,275	2,000	−36.25
Total	142,872	142,841	+0.02
Radial	98,164	93,190	+5.34
Production	126,673	128,734	−1.60
Radial	86,385	82,612	+4.57
Ending Inventory	31,456	32,030	−1.79
Radial	23,854	22,068	+8.00
Truck & Bus Tires			
Shipments			
Original Equipment	3,991	5,042	−20.84
Radial	1,583	1,328	+19.20
Replacement	23,712	24,213	−2.07
Radial	6,915	6,209	+11.37
Export	815	1,473	−44.67
Radial	233	203	+14.78
Total	28,518	30,728	−7.19
Radial	8,731	7,740	+12.80
Production	24,270	27,423	−11.50
Radial	6,307	5,192	+21.48
Ending Inventory	6,660	7,457	−10.69
Radial	2,552	2,471	+3.28



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ically controlled machinery and computer numerically controlled machinery.

Washburn-Linder & Co. opened its new 22,000 sq. ft. office and warehouse facility in Framingham, MA. The company is a distributor of industrial chemicals to New England and New York.

Great Lakes Chemical restructured its worldwide flame retardant marketing, business development and planning functions into a new Flame Retardant Business Center.

A total of 43 new companies have joined the National Association of Recycling Industries bringing the total to 1,145, the second highest year-end total in NARI history.

Stauffer Chemical Co. has started up a Resource Recovery Service to capture by-product value from haz-

RMA industry rubber report through September 1982 (figures are expressed in metric tons)

	Cumulative 1982	Cumulative 1981	% Change 82 vs 81
Total New Rubber			
New rubber available	1,854,762	2,163,383	-14.27
Exports	242,523	292,955	-17.21
Consumption	1,649,985	1,938,985	-14.86
Total Natural Rubber			
Imports	471,621	494,372	-4.60
Stock pile deliveries		702	-100.00
Re-exports	11,329	13,270	-14.63
Consumption	416,992	485,086	-14.04
Total Synthetic Rubber			
Production	1,285,125	1,568,280	-18.06
Imports	98,016	100,029	-2.01
Exports	231,194	279,685	-17.34
Consumption	1,232,994	1,452,941	-15.14
% Total New Rubber	74.73	74.97	
Total SBR			
Production	674,237	807,250	-16.48
Imports	40,489	36,502	10.92
Exports	68,248	86,334	-20.95
Consumption	691,476	787,122	-12.15
Total Nitrile			
Production	36,364	49,965	-27.22
Imports	5,795	8,180	-29.16
Exports	4,849	5,262	-7.85
Consumption	39,871	50,806	-21.52
Polybutadiene			
Production	223,310	261,281	-14.53
Imports	22,561	21,919	2.93
Exports	10,776	24,247	-55.56
Consumption	230,774	260,044	-11.26
Ethylene-Propylene			
Production	99,524	137,712	-27.73
Imports	180	150	20.00
Exports	21,821	25,406	-14.11
Consumption	88,941	102,759	-13.45
Butyl, Polyisoprene, Silicone and other Synthetic Elastomers			
Production	162,476	202,808	-19.89
Imports	27,948	31,898	-12.38
Exports	88,958	100,523	-11.50
Consumption	123,206	177,866	-30.73
Butyl			
Imports	20,949	18,621	12.50
Exports	47,371	52,812	-10.30
Polyisoprene			
Imports	4,104	9,127	-55.03
Exports	3,756	6,088	-38.30
Polychloroprene			
Production	89,214	109,265	-18.35
Imports	1,043	1,390	-24.42
Exports	36,542	37,912	-3.61
Consumption	58,726	74,344	-21.01

ardous wastes generated by the rubber and plastics industries as an alternative to several on-site and off-site disposal techniques currently used.

Camalloy Wire purchased the Alloy Metal Wire Works, Prospect Park, PA from the **H.K. Porter Co.**

Travenol Laboratories, Round Lake, IL, formed an elastomer technology group to assess current and new technologies specifically for elastomers used in the medical field.

Millmaster Onyx Group, a newly formed company, purchased the assets of Millmaster Onyx Corp., a wholly owned subsidiary of **Gulf Oil.** The company produces fatty acids and derivatives, surfactants, quaternary compounds, urethanes plastics, plasticizers, printing inks, shellac, coatings, intermediates, textile chemicals specialties and additives for oil formation fracturing compounds.

InterSystems Industrial Products, Inc. has been formed as a subsidiary of InterSystems, Inc., Omaha, NE to handle increasing activities in the industrial field. The company will specialize in automatic sampling systems, material handling equipment, pneumatic delivery systems and temperature monitoring devices.

Contracts, licenses

Pennwalt has added six sales agents for its rubber accelerator products, **Lincoln-Fairfield Co.,** Wayland, MA has the New England territory; **Western Reserve Chemical,** Akron, OH in the near Midwest; **Tumpeer Chemical,** Chicago, IL, midwest; **Cobbe and Associates,** Atlanta, GA, south; **Chemical Marketing Associates,** Houston, TX, southwest; and **H.M. Royal, Inc.,** Downey, CA, the west coast.

Dunlop signed a contract with the Guangzhou Rubber Bureau in China for the supply of technology, plant, equipment and technical assistance for the modernization of the Bureau's cross ply truck tire factory near Canton. The contract is worth £5.7 million.

Resinall Corp, Stamford, CT appointed **T.H. Hilson Co.,** Chicago, IL, **R.B. Patterson & Co.,** Dallas and Houston, TX and **Mattes·n-Ridolfi, Inc.,** Riverview, MI as sales representatives for its hydrocarbon, rosin-based, and specialty resins for the rubber industry.

Union Carbide's Solvents & Coatings Materials Division was awarded a contract by **General Electric** for the design and fabrication of a Purasiv HR unit to recover a light chlorinated hydrocarbon to be installed at a G.E. facility.

HunterLab, Reston, VA, named **ColorSmith,** Naperville, IL sales representative for its line of laboratory and on-line color and appearance measurement products in the Midwest.

Carbon Black Industry in the U.S.A. (Metric Tons)

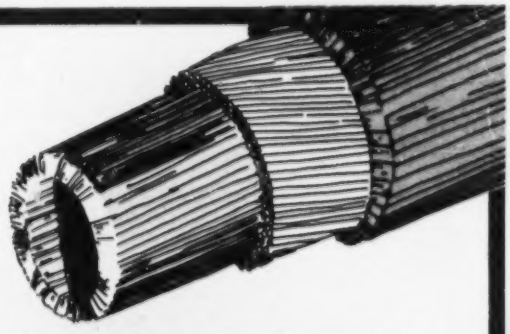
		1982 9 Months	Percentage Change 9 Months '82 vs. 9 Months '81
N-100 (SAF)	Prod.	12,817	−17.5%
	Ship.	12,943	−18.3%
N-200 (ISAF)	Prod.	80,664	−21.7%
	Ship.	82,685	−20.2%
N-300 (HAF)	Prod.	342,990	−10.7%
	Ship.	347,924	−9.3%
N-500 (FEF)	Prod.	75,143	−27.9%
	Ship.	79,582	−24.2%
N-600 (GPF)	Prod.	202,267	−14.2%
	Ship.	202,401	−13.0%
N-700 (SAF)	Prod.	71,667	−29.1%
	Ship.	75,527	−23.4%
Total	Prod.	785,548	−16.8%
	Ship.	801,063	−14.7%
Domestic Shipments (Included Above)		780,078	−13.6%

SBR Black Rubber Production (Metric Tons)

	1982 9 Months	Percentage Change 9 Months '82 vs. 9 Months '81
Net Polymer	105,560	−9.7%
Oil	44,535	−0.9%
Oil % of Net Polymer	42.2%	
Net Rubber	150,095	−7.3%
Net Rubber % of Dry SBR	24.6%	
Carbon Black	66,207	−17.0%
Total SBR Black Rubber	216,302	−10.5%

Reclaimed rubber statistics (metric tons)

	1981	1980	1979	1978
Production	81,801	86,892	123,742	123,721
Imports	4,638	6,907	2,483	2,693
Exports	2,782	3,602	1,494	3,624
Apparent consumption	83,657	90,197	124,731	122,790
Reclaim share of market*	2.9%	3.1%	3.7%	3.6%
Stocks, end of period	10,165	8,900	15,974	12,387



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Name	Symbol	PRICE High	Low	Close	Change Amt	Change Pct	52 Week High	52 Week Low	TREND TO MARKET Price Trend (% per day) Last 30 Days	Price Trend (% per day) Last 5 Days	Volume Trend (% per day) Last 30 Days	Volume Trend (% per day) Last 5 Days	EARNINGS/SHARE Last Fiscal Year	Latest 12 Months vs. Preceding 12 Months Change Amt	Latest 12 Months vs. Preceding 12 Months Change Pct	5 Year Annual Growth Rate	Profit Margin
		$	$	$	$	%	$	$	%	%	%	%	$	$	%	%	%
Tires and Inner Tubes																	
Aegis Corp	AO	2.63	2.13	2.63	.25	10.53	3.00	2.00	.01	1.44	.26	10.04	.42	.07 N	21.2	5.0	2.7
Alliance Tire	ATRA	10.75	8.50	10.63	1.50	16.44	10.75	6.00	.03	3.90	-2.92	18.71	.02	-1.82 N	-170.5	-21.0	.7
Armstrong Rub	ARM	33.00	29.00	32.63	3.50	12.02	33.00	14.00	.25	1.06	.23	23.64	3.93	-.29 F	-6.8	-1.0	2.7
Bandag Inc	BDG	45.00	38.75	41.63	3.38	8.82	45.00	20.75	.42	-1.20	3.17	-7.14	2.76	.09 N	3.2	16.0	10.7
Cooper Tire	CTB	37.75	34.75	36.75	.88	2.44	37.75	14.25	.07	.07	-3.58	.55	4.05	-.20 N	-4.4	29.0	4.4
Dunlop Holding	DLP	.88	.75	.81	.00	.00	1.50	.63	.18	.79	-3.03	6.29	-.04	.00 F	NE	-24.0	-.3
Firestone Tire	FIR	20.25	17.00	17.75	-.50	-2.74	20.25	9.75	.23	-2.31	2.16	-7.81	1.37	-.29 F	-17.4	-9.0	1.9
Gen Tire	GY	35.25	27.75	33.75	6.38	23.29	35.25	17.88	.91	-.73	3.57	17.30	2.63	-.33 N	-10.9	-16.0	3.0
Goodrich B F	GR	36.00	31.50	34.13	2.00	6.23	36.00	16.63	.24	-1.14	2.43	32.74	3.51	-2.13 N	-64.1	-18.0	1.3
Goodyear Tire	GT	36.88	33.88	33.88	-1.13	-3.21	36.88	18.38	.15	-1.25	-1.26	-4.50	3.36	-.61 N	-15.8	4.0	2.7
Mohawk Rub	MWK	27.75	24.00	26.50	1.50	6.00	27.75	15.63	.14	-.07	7.52	-33.10	4.17	-.25 N	-6.0	53.0	4.0
Uniroyal Inc	R	13.88	11.00	12.75	1.50	13.33	13.88	5.88	.57	-.98	2.83	8.21	1.41	-.91 N	-51.4	72.0	2.0
Rubber Products																	
Amerace Corp	AAE	19.63	17.25	19.25	.00	.00	20.00	14.13	.23	.32	.85	46.83	3.51	-1.42 N	-40.9	-2.0	3.2
Am Biltrite	ABL	5.00	3.50	4.75	1.13	31.03	9.25	3.50	-3.34	2.18	-.96	-1.46	-.35	-.81 N	-132.7	NE	-.7
Carlisle Corp	CSL	34.63	30.88	34.25	1.75	5.38	34.75	18.50	-.14	.80	2.03	10.46	3.76	-.49 N	-13.4	30.0	8.7
Dana Corp	DCN	35.88	33.38	35.50	1.50	4.41	35.88	21.88	.17	-.08	3.04	-14.30	3.25	2.28 N	NC	-10.0	4.3
Dayco Corp	DAY	11.25	9.88	10.50	.50	5.00	13.00	6.25	.37	-.69	1.42	-9.02	.25	-1.28 F	-83.6	-28.0	.2
Grt Amer Ind	GRI	13.13	11.38	12.88	.88	7.29	16.38	11.00	-.53	-.28	-.32	41.57	3.87	-1.93 N	-45.4	4.0	4.3
OSullivan Cp	OSL	21.75	20.75	21.50	.25	1.18	21.75	12.16	-.16	.09	4.97	4.35	1.80	.18 N	10.4	14.0	7.3
Pantasote Inc	PNT	3.50	2.50	3.25	.50	18.18	4.50	2.50	.44	-1.20	.44	64.29	-.02	-1.18 N	-245.8	-33.0	-.1
Plymth Rub A	PLRA	3.88	2.50	3.25	.88	36.84	3.88	2.00	1.17	-.89	-.45	-25.00	.38	-1.07 N	-159.7	80.0	.9
Plymth Rub B	PLRB	3.88	2.25	3.25	1.00	44.44	3.88	1.75	1.39	.30	5.18	-59.26	NA	NA	NA	NA	NA
Rubbermaid	RBD	30.88	29.25	30.88	.88	2.92	32.00	17.44	-.29	.52	-2.80	-25.14	1.66	.15 N	9.4	10.0	7.2

(KEY: NA—Not Applicable NC—Not Calculable NE—Negative Earnings)
Q—First quarter S—Six months N—Nine months F—Fiscal year
**—Other than a quarterly multiple resulting from a fiscal year change*
Table prepared by Media General Financial Services Richmond, Va. 23261

Markets, news

Furnace black production for the third quarter of 1982 was down 8% from the previous quarter and 19% lower than the third quarter of 1981 according to a report from Columbian Chemicals. The nine month output of 786 million metric tons was 17% lower than the year previous. Shipments of 260 mmt in the third quarter were the lowest level since the second quarter of 1967, down 18% from the year ago period. N-500 and N-700 were the lowest since the second quarter of 1967 and 1975 respectively. For the first nine months, shipments decreased 15% to 801 mmt. All grades were down, ranging from 9% in N-300 to over 23% in N-500 and N-700.

Parallelling the furnace shipments, third quarter domestic dry rubber hydrocarbon consumption also decreased to the lowest level since the second quarter of 1967. The 463 thousand metric tons shipped was 11% below the second quarter and 21% below the third quarter of 1981. Nitrile was the lowest since the fourth quarter of 1971 and natural was at the lowest point since 1967. For the first nine months, consumption decreased 15% from 1981 to 1,535 mmt. All polymers were down, ranging from 11% in polybutadiene and EPDM to more than 20% in polychloroprene and nitrile.

Production and consumption of reclaimed rubber in 1981 dropped for the third straight year according to the National Association of Recycling Industries. Production dropped to 81,801 metric tons, down 5,000 tons from 1980 and 42,000 tons lower than 1979. Consumption was 83,657 tons compared to 90,197 in 1980 and 124,731 tons in 1979.

Summary

P/E	DIVIDENDS			FINANCIAL POSITION					
							(Last Fiscal Year) Per Share		
P/E Ratio Today	Indicated Dvd. Rate Amt.	Yield	Last X-Dvd Date	(Last Fiscal Year) In $Millions Revenue	Earnings	Current Ratio	Long Term Debt	Stock Equity	Last Bal. Sheet Date
	$	%		$	$		$	$	
6.6	.00	.0	00-00-00	168.4	4.5	2.4	1.81	3.21	1281
NE	.00	.0	06-28-82	69.7	.5	1.2	1.89	6.12	1281
8.3	.80	2.5	11-29-82	560.5	18.6	2.2	22.10	31.88	0981
14.5	.90	2.2	12-15-82	312.5	33.5	4.2	1.02	14.80	1281
8.5	.64	1.7	11-29-82	393.9	17.3	2.3	10.19	19.17	1281
NE	.00	.0	05-26-81	9405.8	-26.5	1.4	.00	1.14	1281
13.0	.80	3.4	12-30-82	3869.0	73.0	1.7	6.92	25.10	1082
12.6	1.50	4.4	11-03-82	2175.2	65.9	1.9	10.53	43.75	1181
28.7	1.56	4.6	11-29-82	3184.6	42.1	1.9	42.17	61.79	1281
10.4	1.40	4.1	02-09-83	9152.9	243.9	2.1	16.06	32.96	1281
6.9	.90	3.4	11-29-82	211.0	8.5	2.4	7.08	24.07	1281
14.8	.00	.0	08-22-78	2260.1	45.3	2.3	17.78	17.14	1281
9.4	1.32	6.9	12-20-82	320.0	10.2	3.1	19.01	44.76	1281
NE	.30	6.3	09-20-82	137.1	-1.0	1.8	2.93	15.44	1281
10.9	.92	2.7	11-12-82	406.3	35.3	2.8	4.36	14.28	1281
15.6	1.80	4.5	11-22-82	2711.1	115.6	2.3	10.95	28.22	1281
42.0	.16	1.5	12-28-82	787.0	9.0	2.1	26.87	23.63	1081
5.5	.00	.0	00-00-00	144.3	6.2	2.0	8.10	22.60	1281
11.3	.56	2.6	12-09-82	73.7	5.4	3.8	.00	10.52	1281
NE	.00	.0	11-02-81	149.8	-.1	1.8	3.70	8.22	1281
NE	.00	.0	00-00-00	69.6	.6	1.5	.00	7.43	1181
NA	.00	.0	00-00-00	NA	NA	NA	NA	NA	NA
17.8	.64	2.1	02-07-83	357.1	25.6	2.0	1.02	10.03	1281

All information in this table is based on sources believed to be reliable, but its accuracy is not guaranteed. Every effort will be made to correct errors, when discovered in future editions.

Firestone's capital expenditures for fiscal 1983 will total approximately $300 million, a 50% increase over 1982. This amount includes $125 million to modernize and automate tire plants worldwide, $100 million to expand its tire network and add sophisticated engine diagnostic equipment to additional stores and will also include a $25 million investment to construct its single-ply rubber roofing facility in Prescott, AR.

The Malaysian Industrial Development Authority says exports of latex rubber gloves from Malaysia is currently in excess of 200 million pairs making it the largest exporter in the world. Production increases of 5% a year is expected to bring exports to well over 300 million pairs by 1985 and 800 million pairs by 1990. The glove manufacturing has led to the production of other latex-based items with Malaysia producing 30% of world demand for catheters, an estimated 45 million pieces a year, and 10% of the world market for latex thread.

Occidental Petroleum has dissolved its agreement with **Ente Nazionale Idrocarburi** of Italy concerning the chemical business of their joint venture. ENI planned to purchase various Montedison chemical plants in Italy and Occidental was against the idea. The move will enable ENI to proceed with the Montedison acquisition.

The rate of inflation for tire and rubber machinery and equipment dropped considerably during the last six months of 1982 according to a study released by the Kemper Group. For the first six months of last year costs for machinery and equipment increased an average of 3.04% compared to a rise of 1.26% for the last six months. This was the fourth straight six-month period that the inflation rate declined.

Price changes

J.M. Huber Corp. rescinded a price increase for its thermal black products announced last month.

Dow Chemical raised the selling price of its entire line of specialty olefin films four to six cents per pound.

Emery Industries reduced the price of its technical grades of stearic acid from 7-10¢ per pound.

Borg-Warner announced the price schedule for its new Prevex brand engineering polymer. Prevex general purpose grade PQA is $1.77 per pound, flame retardant grade VKA is $1.65, high heat flame retardant grade VQA is $1.85 and structural foam grade BJA is $1.27.

Financial statements

Cabot reported 1982 net income of $88 million, off 20% from the previous year. Sales for the year totaled $1.58 billion dollars. The company reported the continuing low levels of demand for carbon black in North America and Europe led to a modest decline in its performance chemicals group.

Compo Industries had a 1982 net income of $1.88 million on sales of $106.7 million.

Dayco reported 1982 net earnings of $1.6 million on sales of $704.5 million. The units showing the largest profit contributions were L.E. Carpenter, Colonial Rubber, The Rubber Products Co. and the Automotive Aftermarket Co.

Eagle-Picher reported that 1982 net income was $11.4 million on sales of $531 million.

Exxon's third quarter 1982 net income totaled $1.07 billion on revenues of $25.2 billion.

Firestone reported net income for 1982 of $6 million on sales of $3.8 billion. The World Tire Group's operating income for the year totaled $188 million, the Sales and Marketing Operations Group had an operating income of $41 million and the Diversified Products Group had an operating income of $22 million.

Petrolane reported 1982 operating income was $104 million on revenue of $571 million.

Pfizer reported net income for 1982 of $332.8 million on sales of $3.45 billion. The specialty chemical business sales decline by 2 %.

Scientific-Atlanta posted a first quarter loss of $6.1 million and had sales of $75.2 million.

Sheller-Globe reported 1982 net income of $14.1 million on sales of $500.2 million.

Footwear industry asks for fair trade

by Joseph Kuebler
Business editor

When is free trade not fair trade? Just ask the American footwear industry. Their counterparts overseas are flooding the U.S. Market with footwear while the American companies face virtually impenetrable barriers when they attempt to export into those countries.

The situation has become so critical that imports captured more than 60% of the U.S. rubber and plastic footwear business last year, up from 50% the preceding year.

Unemployment in the American industry is nearly double the national rate. Some 20,000 jobs were lost in direct manufacturing in 1982 alone. Overall 165,000 jobs have been wiped out in the last dozen years with the closing of 400 shoe factories.

It was against this background that the Footwear Industries of America, (FIA) joined by two AFL-CIO labor unions, filed unfair trade cases against eight countries and the European Community under Section 301 of the U.S. Trade Act.

The industry-labor coalition has called on the U.S. government to negotiate the elimination of trade barriers and unfair trade practices and to use it as a test case to prove the government's reinforced free trade policy.

In spelling out this policy, President Reagan emphasized that free world countries should go forward and sustain the drive toward more open markets or "risk sliding back toward the mistakes in the 1930's and succumbing to the evils of more and more government intervention."

George Langstaff, president of Footwear Industries, hopes the coalition's current campaign for a free and open world market in footwear "can be used as the spearhead to batter down trade barriers around the world."

He pointed out that other countries already have succumbed to government intervention in international trade, noting that his industry has been experiencing the result of that

Rubber and Plastics Footwear (SIC 3021): trends and projections 1972-83
(In millions of dollars except as noted)

Item	1972	1977	1979	1980	1981[1]	1982[2]	Compound annual rate of growth 1972-82	1983[3]	Percent change 1982-83[3]
Industry data									
Value of shipments[4]	600	517	536	591	585	550	—	—	—
Value of shipments (1972 $)[1]	600	386	348	370	355	325	-3.8	315	-3.1
Total employment (000)	32	20	18	18	17	16	-4.1	15	-6.3
Production workers (000)	27	16	15	16	15	13	-4.3	12	-7.7
Average hourly earnings of production workers ($)	2.76	3.86	4.20	4.55	4.90	5.48	7.1	—	—
Capital expenditures	18	11	11	13	—	—	—	—	—
Product data									
Value of shipments[1]	494	405	478	503	500	475	—	—	—
Value of shipments (1972 $)[1]	494	301	311	315	305	280	-3.7	270	-3.6
Product price index (1972 = 100)	100.0	133.3	153.1	159.0	164.8	169.5	—	—	—
Quantity shipped (million pounds)	179	115	112	98	94	88	-4.2	85	-3.4
Trade									
Value of exports	1	6	13	19	20	17	—	20	17.6
Value of imports	254	642	404	480	638	375	—	500	33.3
Export/shipments ratio	.002	.015	.027	.037	.040	.036	—	—	—
Import/new supply ratio[5]	.339	.613	.458	.489	.561	.441	—	—	—

[1]Estimated except for product price index, exports, and imports.
[2]Estimated.
[3]Forecast.
[4]Value of all products and services sold by industry SIC 3021.
[5]Value of shipments of rubber and plastic footwear products produced by all industries.
[6]New supply is the sum of product shipments plus imports.

Source: Bureau of the Census and Bureau of Industrial Economics. Estimates and forecasts by the Bureau of Industrial Economics.

intervention for many years.

"Foreign government subsidies of footwear exports, combined with their barriers to footwear imports, have decimated our American companies and deprived our people of thousands of jobs," Langstaff added.

Named in the unfair trade petition are Brazil, Japan, Korea, and Taiwan, plus the European community.

Some of the countries such as Brazil, Korea, and Taiwan, which are among the largest exporters, have the most stringent import restrictions, the FIA reports.

Most of these nations effectively bar footwear imports, Senator William S. Cohen, (R.-ME) said. Cohen, who is chairman of a Senate subcommittee, added that shoe markets in Japan, Korea and Taiwan are virtually impenetrable while Brazil has a 170% tariff on footwear.

"The barriers erected by all these countries are deflecting world production of footwear into the United States at a rapidly accelerating rate," Cohen went on. "I urge the President to move swiftly to correct this intolerable situation."

According to government statistics, shipments of rubber and plastics footwear have been on the decline for many years. In terms of 1972 dollars, shipment values declined 4.1% annually from 1972 to 1980, then declined another 9% in 1981 and a further 3% in 1982.

The outlook for 1983 isn't much better with the government forecasting another 3% decline in domestic shipments. The government is even more pessimistic for the long term prospects of the industry stating in *U.S. Industrial Outlook 1983* that "the most dismal scenario for the rubber and plastics footwear industry would be that it declines to a point where it is no longer economically viable and vanishes as a domestic industry. More likely, some U.S. manufacturers will be able to maintain a competitive position in selected segments of the industry but imports will account for a majority of the footwear consumed." The government foresees more U.S. producers ceasing production and becoming marketers or distributors, a trend now underway.

Joining the Footwear Industries in the fight against unfair trade barriers are the Amalgamated Clothing and Textile Workers Union and the United Food and Commercial Workers' International Union.

NEARLY ONE million pairs of these soles were sold last year by Goodyear.

Carrying their complaint to the foreign governments will be U.S. Trade Representative William E. Brock who plans to consult first with Brazil, Japan, Korea and Taiwan.

"If these consultations are unsuccessful in resolving market access to U.S. companies in foreign countries, we will initiate international dispute proceedings," Ambassador Brock said.

"We are confident our industry and its workers can compete effectively, providing all countries play by the same set of rules."

By negotiating the lifting of import barriers on footwear thrown up by other countries, the FIA contends the President and Brock "have a golden opportunity to test the willingness of our trading partners to cooperate in reviving the world economy and establishing an equitable system of world trade."

"We are confident our industry and its workers can compete effectively, providing all countries play by the same set of rules," the FIA added.

"This is an important and viable industry, and a technologically advanced industry," Langstaff said. "It is a $9.5 billion industry at retail and it accounts for a $1 billion annual payroll in direct manufacturing alone."

He noted there are still about 300 shoe companies operating nearly 700 plants in 38 states and he is confident the action taken by Ambassador Brock indicates the Reagan Administration is concerned about preserving the industry and the almost 200,000 jobs that depend upon it.

Meanwhile exporting by all American industries received a big boost with the recent enactment of the Export Trading Company Act of 1982.

The measure provides small and medium-sized companies an opportunity to compete in world markets on an equal footing with companies in other countries for the first time in nearly a century, according to Secretary of Commerce Malcolm Baldridge.

He believes this opportunity will lead to the creation of hundreds of thousands of new American trade-related jobs in the near future.

The export act enables firms to band together in a company to export without fear of running afoul of antitrust laws. It also allows banks to bring their experience and resources into such ventures.

"Thousands of small and medium-sized firms produce goods and services that are competitive overseas but they are inhibited from exporting by their unfamiliarity with foreign markets, customs and laws," Baldridge explained.

"Individually they can't afford the costs and risks to develop the necessary expertise to penetrate those markets," he added.

Export trading companies can provide these firms with a full range of export services and can serve as ideal intermediaries to facilitate the exports of member firms.

Baldridge noted that trading companies are a major tool of our foreign competitors in the world market. Two-thirds of Japan's exports are handled by such companies. West Germany, France and Hong Kong also are major users of specialized export entities.

"The resources of such firms are one reason our competitors are increasing their share of world exports," Baldridge said. "Since 1970 the U.S. share declined from 15 to 12%, representing a cumulative loss of $73 billion."

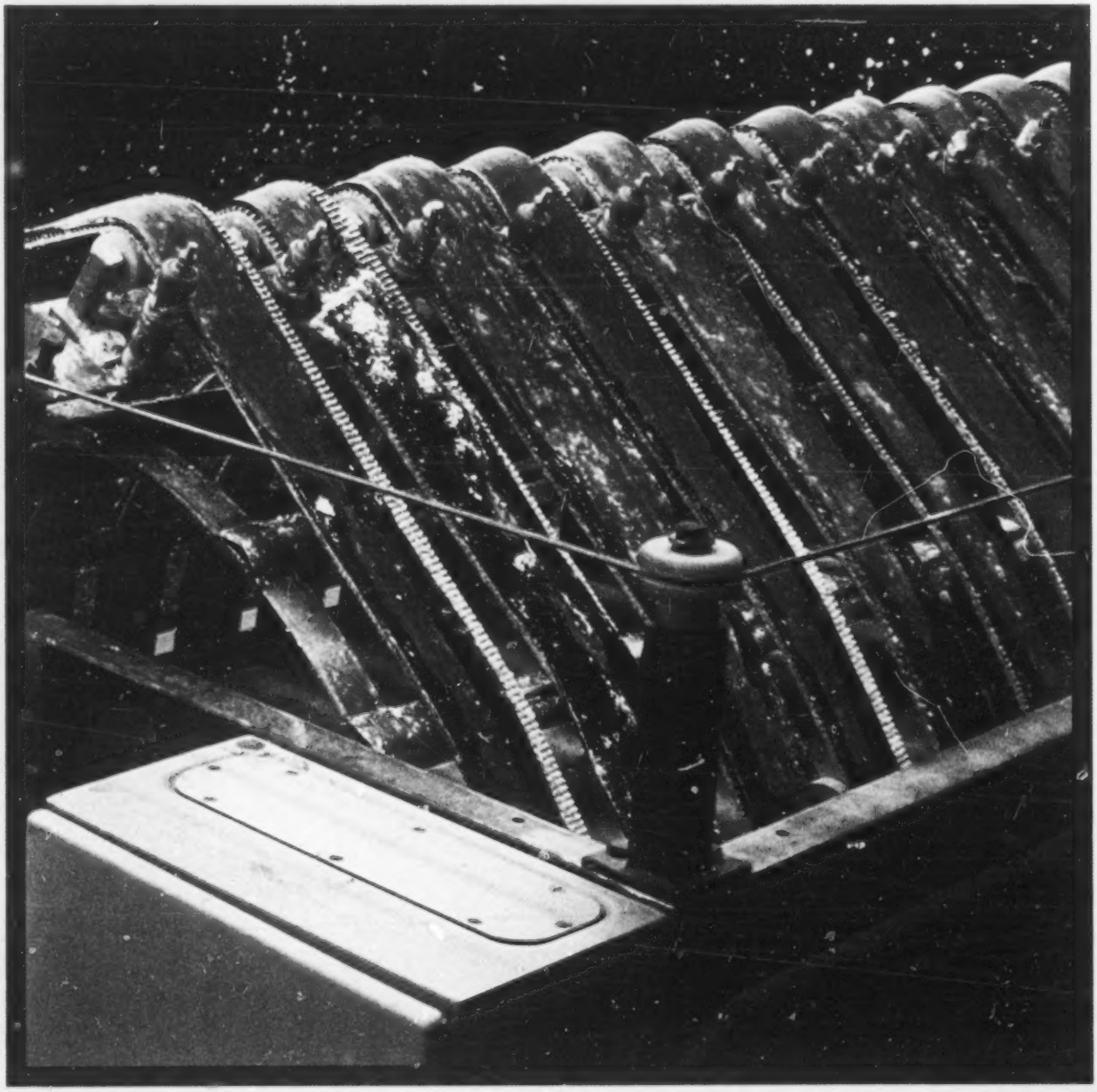
The legislation is viewed as a major step forward in the Administration's drive to expand exports and create new jobs.

An independent study conducted by Chase Econometrics has estimated that by 1985 export trading companies could increase employment by 320,000.

Rubber World

TECHNOLOGY/MARKETS/NEWS VOLUME 187, NO. 6 MARCH 1983

An alternative to 'multi-strip' removal feed stock production



Compounding NBR to specifications

Semi-annual price list

Premiering 'Tech Service' department page 12

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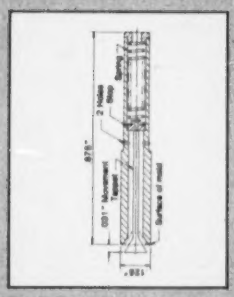

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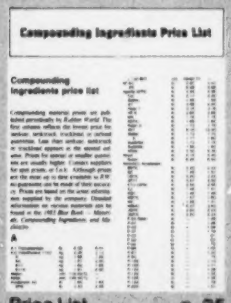

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Cover shows individual strips of rubber passing through a cooler on leader belts. Photo courtesy of Goodman Machinery, a division of Goodman and Son, Inc.

ABP

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Business Briefs

Acquisitions, expansions

An agreement to merge **Celeron Corp.** with a wholly-owned subsidiary of **Goodyear** was approved by directors of both companies. Celeron operates natural gas transmission systems, principally in Louisiana and is involved in a wide range of oil and natural gas related activities. Under the merger agreement, each outstanding share of Celeron common stock will be exchanged for 1.15 shares of Goodyear common. The transaction would have a value of approximately $825 million based on Feb. 7, 1983 stock prices.

Du Pont started up new facilities which triple manufacturing capacity for its Kevlar aramid fiber. The $200 million expansion program covering ingredients, polymer and fiber at four Du Pont sites in three states increases capacity to 45 million pounds annually.

A new plant dedicated to manufacture fluorelastomer terpolymers has been completed by **3M's Specialty Chemical Division** at its Decatur, AL site.

Continental Carbon bought **Columbian Chemicals** 39% interest in a carbon black manufacturing plant near Rotterdam, Holland as part of a general restructuring of European operations by both companies. The two had owned the plant since it was built in 1960.

Flexfab acquired certain tooling, inventory and equipment of the Flexible Tubing Division of **Automation Industries** in Abbeyville, SC and is moving the acquisitions to its Hastings, MI plant.

Essex Chemicals reached a preliminary agreement with **Albany International Corp.** to purchase Albany's chemical subsidiary in Columbus, OH. The plant produces pheromones, agricultural and pharmaceutical intermediates, flavor and fragrance chemicals and other fine chemicals.

Rousselot SA, a French manufacturer of gelatin, industrial adhesives and specialty thermosetting materials acquired Polyrez Company, Inc., Woodbury, NJ a specialty manufacturer of phenolic resins.

Kerr-McGee Chemical is undertaking a $4 million expansion of its rutile grade titanium dioxide plant in Hamilton, MI, increasing capacity to 63,500 tons annually when completed by the third quarter of 1984.

Primeline Industries, Cuyahoga Falls, OH bought the Rubber Latex Products Division of **Rechhold Chemicals** for approximately $1.5 million.

United McGill Corp., Groveport, OH, has purchased the assets of the Lord Acoustical Products Division in Erie, PA.

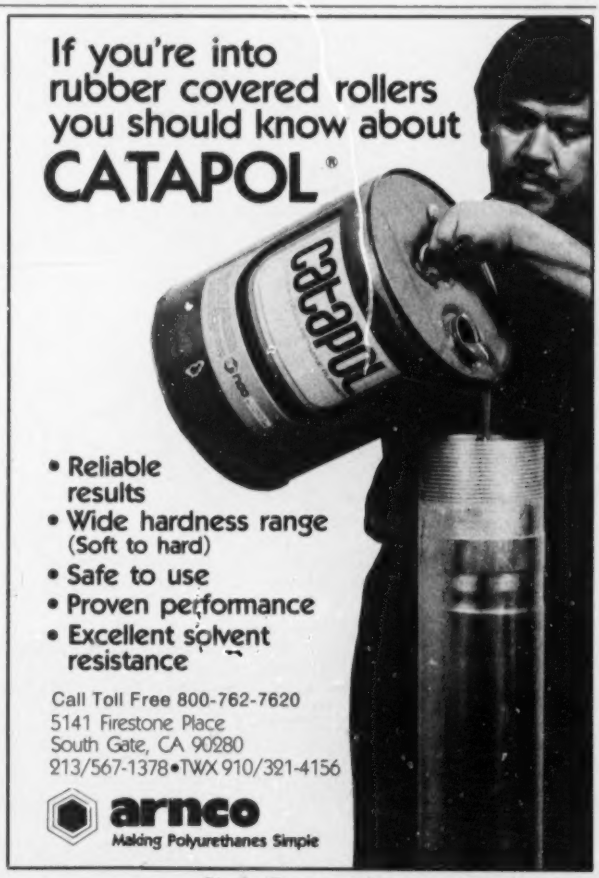
Killion Extruders is building a new plant in Riviera Beach, FL, that will increase its production capabilities, enlarge its engineering department and expand its extrusion equipment laboratory facilities.

Rubbercraft Corp., Torrance, CA, has been acquired by **Itran Corp.**, South Plainfield, NJ designers and manufacturers of custom molded rubber components.

Compo Industries acquired the assets of **Dansym Pierre Co. SA** a firm based in Haiti that operates a footwear stitching plant.

RMA monthly tire shipments & production report through November 1982
(Figures in thousands of units)

Passenger Tires	YTD 1982	YTD 1981*	% Change
Shipments			
Original Equipment	30,782	33,937	−9.30
Radial	25,711	28,260	−9.02
Replacement	122,072	116,512	+4.77
Radial	80,030	70,514	+13.50
Export	2,629	3,738	−29.67
Radial	1,395	2,133	−34.60
Total	155,483	154,187	+0.84
Radial	107,136	100,907	+6.17
Production	137,921	140,061	−1.53
Radial	94,224	90,090	+4.59
Ending Inventory	31,803	33,571	−5.27
Radial	24,140	23,171	+4.18
Truck & Bus Tires			
Shipments			
Original Equipment	4,333	5,411	−19.92
Radial	1,751	1,463	+19.69
Replacement	26,010	26,384	−1.42
Radial	7,602	6,810	+11.63
Export	889	1,579	−43.70
Radial	259	226	+14.60
Total	31,232	33,374	−6.42
Radial	9,612	8,499	+13.10
Production	26,607	29,846	−10.85
Radial	6,947	5,683	+22.24
Ending Inventory	6,633	7,541	−12.04
Radial	2,543	2,432	+4.56



Circle 5 on card

manufacturer of electronic medical devices and disposable accessories in an exchange of common stock. Valleylab shareholders received .448 shares of Pfizer common stock for each share of Valleylab common stock.

Parker Hannifin Corp., Cleveland, OH acquired **Roto Actuator Corp.**, a St. Clair Shores, MI manufacturer of hydraulic and pneumatic rotary actuators.

Kalex Chemical Products, Fords, NJ purchased the former Kaye-Tex vinyl film calendering plant at Yardville, NJ from **Stauffer Chemical**. The plant has a 35 million pound annual capacity.

Petrolane Inc. agreed in principle to purchase the LP-gas retail business of **Cities Service Co.** for approximately $30 million in cash.

CasChem, Bayonne, NJ acquired the Azethane Polyurethane product line from **AZS Corp.**, Atlanta, GA.

Cal Controls Inc., manufacturers of industrial temperature control equipment is moving into expanded facilities in Libertyville, IL.

RMA industry rubber report through November 1982 (figures are expressed in metric tons)

	Cumulative 1982	Cumulative 1981	% Change 82 vs 81
Total New Rubber			
New rubber available	2,057,413	2,418,130	-14.92
Exports	265,896	320,163	-16.95
Consumption	1,873,635	2,159,111	-13.22
Total Natural Rubber			
Imports	526,858	565,038	-6.76
Stock pile deliveries		702	-100.00
Re-exports	12,553	14,221	-11.73
Consumption	520,036	542,420	-4.13
Total Synthetic Rubber			
Production	1,420,304	1,738,264	-18.29
Imports	110,251	114,126	-3.40
Exports	253,343	305,943	-17.19
Consumption	1,353,599	1,616,691	-16.27
% Total New Rubber	72.25	74.88	
Total SBR			
Production	746,636	894,741	-16.55
Imports	44,423	42,761	3.89
Exports	75,196	96,510	-22.08
Consumption	757,526	874,133	-13.34
Total Nitrile			
Production	40,069	56,371	-28.92
Imports	6,582	9,508	-30.77
Exports	5,412	5,866	-7.74
Consumption	44,569	56,271	-20.80
Polybutadiene			
Production	251,069	290,497	-13.57
Imports	25,188	24,946	.97
Exports	12,189	25,505	-52.21
Consumption	254,099	290,770	-12.61
Ethylene-Propylene			
Production	111,182	153,525	-27.58
Imports	193	150	28.67
Exports	23,920	28,022	-14.64
Consumption	98,577	116,266	-15.21
Butyl			
Imports	23,694	20,606	14.99
Exports	51,430	56,246	-8.56
Polyisoprene			
Imports	4,791	9,931	-51.76
Exports	4,262	6,732	-36.69
Polychloroprene			
Production	100,648	121,339	-17.05
Imports	1,153	1,684	-31.53
Exports	39,106	41,464	-5.69
Consumption	65,596	82,636	-20.62

Contracts, licenses

MERG, the affiliation of Mantaline Inc., Geneva Rubber, Robin Industries and Elasto-Tec has named **Landfear & Brophy**, Rochester NY as its sales representatives in the state of New York excluding New York City and Long Island and **Lauber & Associates**, Kirkwood, MO in the same capacity for the central midwest.

BFGoodrich received two government contracts worth an estimated $5.3 million. BFG will provide the U.S. Air Force attenuators for the F-111 aircraft. Attenuators are inflatable rubber devices used to cushion the landing of the ejection capsule after bailout. The U.S. Navy contracted for sonar domes used on naval vessels.

Goodyear appointed **K/B Litho Supply**, Kansas City, MO as distributor for its printing products in the U.S. and South America.

The Flexible Tubing Division of **Automation Industries** appointed **J.F. Arthur Co.**, Spokane, WA and **Sunday & Associates**, Bedford, TX as sales representatives for its nonmetallic industrial and commercial tubing and hose. Arthur will cover the Pacific northwest and Sunday will handle Texas.

CdF Chimie of France and **Eastman Kodak** concluded an agreement where Kodak is granted a license for Chimie's high pressure process for the production of linear polyethylene. Kodak will use the process in its plant now under construction in Longview, TX.

Caschem, Inc. appointed **Ambrosia Industrial Chemical** as a distributor for its castor oils and castor based specialty chemicals for the state of Florida.

A $300,463 grant has been awarded to the University of Akron's **Institute of Polymer Science** researchers for improved tank treads research by the U.S. Army.

Purnell International, Houston, TX has been appointed exclusive USA marketing agency for Geometrik Systems a three-stage volumetric metering device manufactured by **Geosource, Inc.**

Bellofram Corp. appointed **Fleck Brothers**, Vancouver, BC, Canada and **Euroval, Barcelona**, Spain as authorized distributors of its products.

Financial statements

Armstrong Rubber reported net income of $4.6 million on sales of $139.1 million for the first quarter. Growth in the replacement tire market was cited for the record earnings.

Asarco Inc. reported a loss of $38.7 million with sales of $1.35 billion for 1982.

Cabot Corp. reported net income of $19.7 million on sales of $379.2 million for the first quarter. Sales and operating profits were up from a year ago for the energy group and down for the engineered products and performance chemicals groups.

Cooper Tire had a net income for 1982 of $19 million on sales of $430.3 million. Sales of replacement tires were good but truck tire sales were soft the company reported. Sales of industrial rubber products remained depressed.

General Tire reported a net income of $19.4 million on sales of $2 billion for 1982.

The strength of its U.S. operations was a major factor given by **Goodyear** as it posted record earnings of $264.8 million in 1982 on sales of $8.69 billion. Increased market share for replacement tires in the auto market, increased market share in all truck tire categories, the highest sales

year ever for Goodyear Aerospace and increased market share in the Chemical Division helped lead the way.

Gulf Oil earned $900 million in 1982 on revenues of $30.66 billion. U.S. Chemical operations lost $264 million. Deteriorating product prices for olefins and plastics were part of the cause.

Exxon estimated net income for 1982 at $4.1 billion on revenues of $103.6 billion. Earnings from worldwide chemical operations were $238 million.

Compo Industries reported a net income for the first quarter of $104,000 on revenues of $22.2 million.

Lydall reported a loss for 1982 of $1.5 million. Sales were $98 million for the year.

Owens-Corning Fiberglas had earnings of $29.7 million for 1982 on sales of $2.37 billion.

Rubbermaid Inc. reported earnings of $27.5 million on sales of $376 million for 1982.

Scientific-Atlanta reported net income of $280,000 for its second quarter on sales of $73.4 million.

Markets, news

EP/EPDM is the only special synthetic rubber for which growths well above the gross national product growth levels are expected for Western Europe according to the new long term forecast compiled by the International Institute of Synthetic Rubber Producers. In arriving at the estimated consumptions, the Institute's European committee took into account the extent to which the projected growth figures were within or outside the range of the major economy parameter for Western Europe as derived from the GNP in each country. For most general purpose rubber types no growth, or even negative growth in relation to the GNP is forecast for the period 1983-1987. IISRP managing director, Milton J. Rhoad stated that a major problem for the industry is the worldwide excess in manufacturing capacity. In western Europe, the excess for certain commodity rubbers is currently 67% above the market requirements with little prospects of achieving acceptable plant loadings throughout the 1980s'.

Reversing the trend of the past three years, the polyurethane industry is heading for five years of growth according to G.T. Harrick, director of marketing, Mobay Chemical. Microcellular urethanes are expected to lead the way with an average gain of 10% during the 1983-1987 period. Rigid foams will rise an average of more than 6% annually and flexible foam will climb by an average of 5%. The three cellular segments will show a combined 8.9% increase in 1983 over 1982 and a combined 32.6% jump in 1987 over 1982. No 1983-1987 forecast was made for the non-cellular portion of the industry, which includes polyurethane coatings, caulks, adhesives, thermoplastics and cast urethanes. Microcellular applications will grow by 12% in 1983 to a total of 100 million pounds, largely in the shoe and automotive industry, and by 65% to 149 million pounds in the five-year period to 1987. Rigid polyurethane foam volume is expected to increase modestly to 580 million pounds this year, a 6% gain over 1982. Flexible foam growth over the next five years will average 5% annually with a strong recovery this year and next.

Total new rubber consumption forecast for Western Europe (Thousand metric tons)

	1981 Actual	1982 Estimate	1983	1987	1990	1992
SBR-solid	600	549	549	598	618	628
SBR-latex	123	103	105	112	115	118
Polybutadiene	215	200	205	220	230	235
Polyisoprene	60	48	45	50	50	50
Ethylene-propylene	118	118	121	135	150	155
Polychloroprene	90	83	84	85	84	84
Nitrile-solid	56	57	58	60	62	64
Nitrile-latex	12	12	12	12	12	12
Other synthetic*	152	135	138	140	147	153
Total synthetic	1426	1305	1317	1412	1468	1499
Natural rubber	805	775	785	810	820	825
Total new rubber	2231	2080	2102	2222	2288	2324
Synthetic percent	63.9	62.7	62.7	63.6	64.2	64.5

*Including butyl rubber

Polyurethane industry forecast — 1982-1987 (all poundage figures in millions)

	1982 (Prelim.)	1983	1984	1985	1986	1987
Flexible foam	1,050	1,155	1,247	1,310	1,310	1,350
		+10%	+8%	+5%	—	+3%
Rigid foam	545	580	635	695	695	735
		+6%	+10%	+10%	—	+6%
Microcellular	90	100	113	125	135	149
		+12%	+13%	+10%	+9%	+10%

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RACKS OF deck shoe soles, manufactured by Goodyear are checked prior to being attached to shoe bottoms. More than two million pair of these shoes were shipped in 1982.

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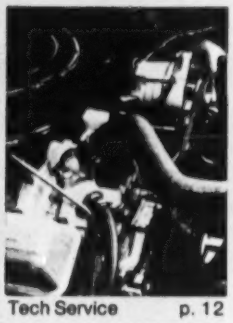

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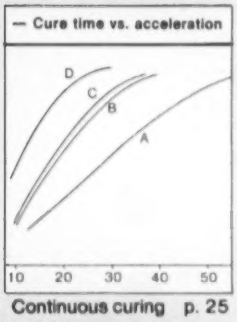

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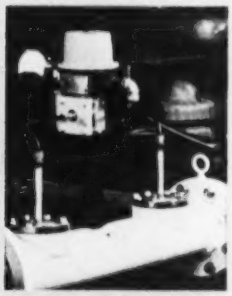

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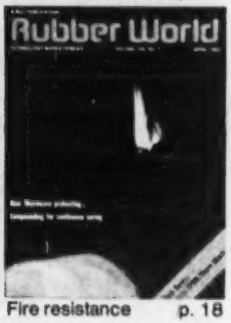

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Cover shows a UL Subject 94 fire resistance test. Photo courtesy of Great Lakes Chemical Corp.

ABP

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RMA monthly tire shipments & production report through December 1982
(Figures in thousands of units)

Passenger Tires	1982	1981	% Change
Shipments			
Original Equipment	33,981	35,979	−5.55
Radial	28,415	29,973	−5.20
Replacement	130,539	125,263	+4.21
Radial	86,000	76,342	+12.65
Export	2,949	4,017	−26.59
Radial	1,521	2,250	−32.40
Total	167,469	165,259	+1.34
Radial	115,936	108,565	+6.79
Production	149,481	149,789	−0.21
Radial	102,322	96,635	+5.89
Ending Inventory	33,125	33,363	−0.71
Radial	24,946	22,989	+8.51
Truck & Bus Tires			
Shipments			
Original Equipment	4,652	5,732	−18.84
Radial	1,910	1,590	+20.13
Replacement	28,149	28,453	−1.07
Radial	8,266	7,377	+12.05
Export	966	1,661	−41.84
Radial	273	237	+15.19
Total	33,767	35,846	−5.80
Radial	10,449	9,204	+13.53
Production	29,019	31,973	−9.24
Radial	7,634	6,158	+23.97
Ending Inventory	6,830	7,500	−8.93
Radial	2,628	2,421	+8.55

ularly heavy market deterioration in basic industries such as oil and mining and general manufacturing, the company said it has a high degree of excess plant capacity, especially in the manufacture of hydraulic and industrial hose and power transmission products.

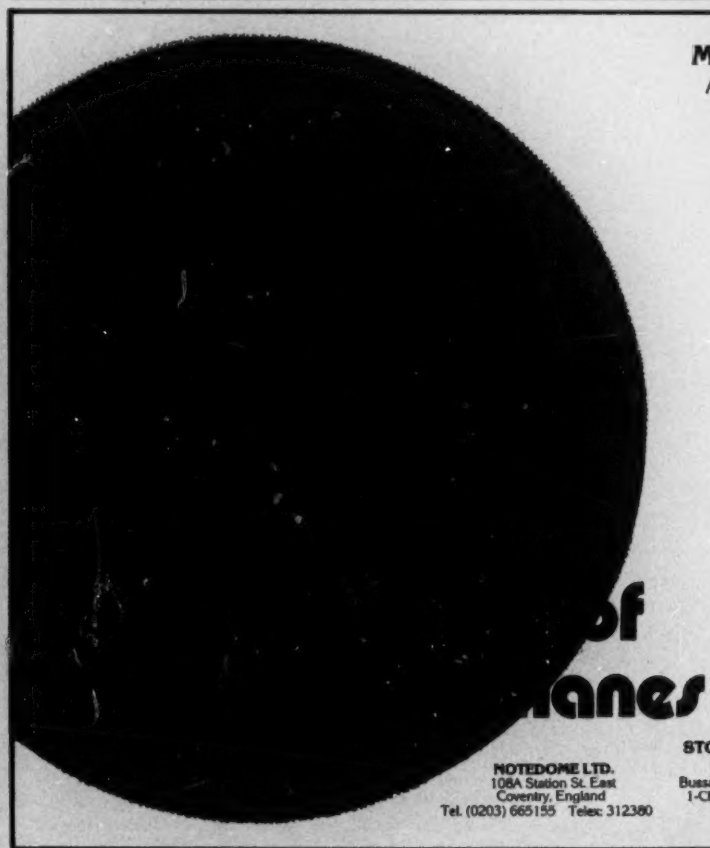
Essex Chemical reported 1982 sales of $161.3 million and earnings of $6.4 million.

Firestone reported first quarter earnings of $18 million on sales of $861 million. Increased shipments of passenger and light truck tires to domestic manufacturers, cost reduction programs, and more profitable operations in certain South American subsidiaries led to an operating income of $54 million in the World Tire Group. The Diversified Products Group improved operating rates at the Synthetic Rubber and Industrial Products Divisions, reduced losses in Liberian plantation operations, reduced costs, and increased profits from rubber roofing sales in posting an operating income of $10 million.

BFGoodrich reported a 1982 net loss of $32.8 million with sales of just over $3 billion. The loss resulted from the economic conditions and a $19.9 million aftertax provision to cover the planned restructuring of several operations, principally in the industrial products division. The company said the tire business continued to perform well, with total domestic shipments to the replacement market rising 13%. Chemical business results reflected the reduced demand in key markets and weak pricing for its largest volume product, polyvinyl chloride. Good results from specialty polyvinyl chloride, latex and specialty polymers and chemicals partially offset the reduced demand and weak pricing in other areas.

Myers Industries had a net income of $2 million for 1982 on sales of $73.8 million. Demand for the company's tire service and retreading equipment and supplies weakened throughout the first three quarters of 1982, then rebounded during the final period but not enough to offset the previous quarters.

Park-Ohio Industries reported a 1982 net income of $10.3 million on sales of $176 million.



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Brad Ragan, Inc. reported a net loss of $116,000 on revenues of $35.8 million for the fiscal third quarter.

Sentrachem Limited, South Africa, reported six month earnings of R14.7 million on sales of R382.4 million.

Sheller-Globe recorded earnings of $1.2 million on sales of $124.6 million for the first quarter.

Sybron reported 1982 income of $5.8 million on sales of $607.9 million.

Markets, news

North American rubber consumption dipped to its lowest level in 15 years according to a preliminary report from the International Institute of Synthetic Rubber Producers. The IISRP estimates for 1982 show consumption of all elastomer categories declining from the 1981 levels with total consumption down 328,000 metric tons. Industry experts attribute the sharp decline to a combination of the general recession plus continued influence of four major factors, high motor fuel prices, lower highway speeds, increased use of longer wearing radials, and a significant downgrading in tire size as smaller cars increase market share. These factors will result in a lower percentage of total rubber used in tire and tire products from 64.1% to 62.1% by 1992.

The IISRP decided to use 1981 figures as its base year since 1982 appears to be an abnormally low year for rubber consumption. Projections of demand through 1992 show compound annual growth rates of 1.3% for both synthetic and natural rubber, which is somewhat less than generally accepted projections for the Gross National Product of 2.5% per year. The IISRP sees consumption rebounding in 1983 somewhat but not reaching 1981 levels.

The Rubber Manufacturers Association reported shipments of passenger tires increased 1.3% in 1982 to 167.4 million tires. The replacement market had a 4.2% increase to 130.5 million units while original equipment slipped 5.5% to just under 34 million. Shipments of truck and bus tires dropped almost 6% to 33.7 million with replacement down 1% to 28.1 million and OE down almost 19% to 4.6 million.

Ian C. Rush retired as chairman and chief executive officer of Polysar Limited. Rush had joined the company in 1943 as a chemical engineer, was named president in 1971, CEO in 1972, and chairman in 1981. He will remain on the company's board of directors. Polysar president, Robert S. Dudley was appointed to the combined role of president and chief executive officer. Dudley, 57, also assumed responsibility for the company's interest in Petrosar Limited.

Legal

UTQGS changes: National Highway Traffic Safety Administration has made changes in 49 CFR Part 575 affecting the Uniform Tire Quality Grading Standards, including suspending, on an interim basis, the treadwear grading requirements of the Standards. No change is made in the requirements of grading traction and temperature resistance performance of new tires except for a minor change in the format for molding those grades on tires.

The UTQGS treadwear grading requirements are aimed at helping consumers assess the value of new tires in terms of relative treadwear performance. But this does not seem to be the case. Available information and analysis indicate the treadwear grades apparently are not only failing to aid many consumers, but also are affirmatively misleading them in their selection of new tires. Unacceptable and unreasonable variability in test results and assigned grades has led to the unreliability of the treadwear grades.

NHTSA is also changing the format for molding grades on new tire sidewalls, including traction and temperature resistance grades but not treadwear grades, which new format must be used on new tires produced in molds manufactured after August 8, 1983. Manufacturers must cease printing tire labels and consumer information materials which include treadwear grades described or characterized as having been determined by or under the UTQGS procedures of the United States Government.

By these amendments consumers should no longer be mislead by unreliable treadwear grade information; furthermore, costs of implementing the treadwear grading program will no longer be imposed on the manufacturers and consumers.

Additional details are available from Joseph Innes, Office of Market Incentives, NHTSA, 400 Seventh Street, S.W., Washington, D.C. 20590.

IISRP North American new rubber consumption forecast
(all figures in m metric tons)

	1981 Actual	1982 Est.	1983 Est.	1987 Est.	1990 Est.	1992 Est.
Styrene butadiene - dry	1,008	894	949	1,050	1,100	1,123
Styrene butadiene - latex	116	104	110	122	129	133
Polybutadiene	377	335	356	403	428	443
Polyisoprene	55	46	49	57	64	67
Ethylene - propylene	140	122	134	164	186	200
Polychloroprene	103	83	89	103	107	111
Butyl	145	108	115	135	144	148
Nitrile - solid	63	51	54	64	69	72
Nitrile - latex	7	6	7	8	8	8
Other synthetic	53	45	51	62	69	73
Total synthetic	2,067	1,794	1,914	2,168	2,304	2,378
Natural rubber	716	661	698	770	808	834
Total new rubber	2,783	2,455	2,612	2,938	3,112	3,212
Tire rubber	1,780	1,607	1,695	1,882	1,986	2,037
Non-tire rubber	1,003	848	917	1,056	1,126	1,175
% synthetic	74.2	73.1	73.3	73.8	74.0	74.0
% isoprenics	27.7	28.8	28.6	28.2	28.0	28.0